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National Unity and the Future

THE Income Tax has not been reduced; the burden of other taxation has not been lessened; there has been no phenomenal inrush of orders; yet who can deny that British industry is breathing more freely than it did three months ago?

Accumulating handicaps, haunting fears concerning the future, and depressed conditions almost everywhere, had become a very real menace. To-day relief has come to the whole body politic, and we can approach our difficulties in a new spirit with a greater sense of certainty and security.

For years past this journal has held that the unemployment burden could not be materially reduced; that no real advance would be made toward Inter-Imperial trade and the utilisation of the vast resources of the British Empire; and that there could be no permanent revival of trade, until we faced our problems as a united people. It has now been abundantly demonstrated that the nation desires all parties to work together to bring back prosperity.

It may well happen that this demonstration of unity in Britain may have a deep and far-reaching effect in other lands now in their periods of crisis, combating adverse influences which stand in the way of development. The restoration of confidence throughout the world is needed to banish our economic dangers.

A changed outlook and a healthier atmosphere, however, will not relieve industry of its own responsibility. One of our electrical leaders has not been slow to emphasise that, however favourable a Government policy may be, we have to help ourselves. All the resources at command must be employed to re-establish our businesses upon a firm and prosperous basis.

When this country introduced a new patent policy, new factories were opened by foreign interests, and existing works undertook the manufacture of certain lines which had previously come from abroad. From the reports that reach us there is already a considerable new movement in the same direction, which may mean that work will shortly be found for many whose hands are idle now.

To electrical ears the message on the wireless that the Central Electricity Board had placed its last big contract for the Grid was far from pleasing. Knowing what the capital outlay upon the Grid undertaking has meant to the British electrical industry during the last few years, one looks for the substitution of other work to occupy our manufacturers during the next five or ten years. And here again we find the necessity for helping ourselves. There is great scope for electrical development at home, and immediate need for action both individual and combined.

If we look abroad the need is greater still. Whatever governments may or may not do in coming days, it is obvious from the information contained in such articles as that contributed by Mr. H. C. Siddeley this week that if British manufacturers mean to increase their sales of electrical products in such markets as the Argentine they must act for themselves.

In South America and in certain other parts of the

world British investors have sold their electrical birthright for a mess of pottage. Shareholders tempted by so many pounds per one-pound share sold undertaking after undertaking to foreign interests. What did it matter to them if the electrical market also went to the foreigner in consequence? It was a profitable business transaction, legitimate enough, of course, but it has seriously prejudiced our situation by placing the foreigners in possession. They are strongly entrenched, and if consumers' orders for household equipment are not to follow the same course as the companies' orders for power-station plant, our producer of apparatus must reach the consumer direct with particulars of his product. It is up to us to help ourselves to this business by intensive propaganda and exhibitions.

Summing up: The people have recognised that they are an industrial people—that most of the other industrial nations of the world are looking after themselves and taking advantage of the fact that our garden gate is so widely open. Whatever our legislators may do toward shutting that garden gate or collecting a toll thereat, the electrical and allied industries have before them plenty of ways in which they must be helping themselves.

Splendid News

FROM reports to hand from various directions we learn that many inquiries are being received for available factories and sites where production may be undertaken. In only a few cases here and there are specific details given; that is what one would expect in these early days. Electric cables, radio apparatus, dry batteries have all been mentioned in general Press news, but the London Chamber of Commerce, which is acting very energetically in dealing with inquiries and tabulating available works, has issued an official list which shows that among those who are thinking of embarking on new ventures are concerns interested in electrical apparatus, lighting equipment, floodlighting devices, wireless sets, rivets and screws, heavy machinery, and general engineering products. The Chamber has appealed for information regarding available factories and factory sites to be sent to its publicity department. Birmingham, too, is very busy along the same lines; the City Information Bureau reports inquiries from the U.S.A., France, Germany, Holland, Sweden, and Belgium, while many British firms are seeking larger premises. Mr. Hamlyn Drake alluded to this subject in his speech at the annual meeting of Drake & Gorham, Ltd., last Friday, when he spoke hopefully of the coming erection of new factories affording a large field of operations for their installation department.

Financing Industry

FOREMOST amongst our problems, as already pointed out, is that relating to the financing of industry both for the electrification of factories at home and for the development of operations overseas. The relation of our banks to the electrical industry is a very old question. In earlier years the German electrical companies were able to make great strides because of their financial connections, and the need for industrial banks here became a subject of constant controversy. In times of emergency, however, the German arrangements did not prove to be over-satisfactory. Our great banking system must be kept secure at all costs—nobody in his senses would ask that it should carry undue risks with everybody's money, after what we have all passed through recently. Special banking and finance organisations such as we have talked about for years, and tried to some extent, are required. Manufacturers will not regard it as safe for them to combine too much finance with their industrial operations if they pay due regard to shareholders' interests. But some of them have already shown that they feel strong enough to allow special credit terms where desirable contracts for electrification are available. Everything, of course, depends upon the circumstances of the case and the security.

A Question of Status

THE decision of Manchester Corporation that the public lighting superintendent shall be a member of the city engineer's staff raises anew the question of the status of the post generally. If it were really necessary that the official responsible for the lighting of the streets should be subordinate to anyone, then the city engineer would probably be as good a "chief" as could be found for him. It would obviously not be good policy, so long as electricity and gas are competitors, for him to be an adjunct of either department, as he must regard illuminating problems from an entirely unbiased point of view—and the electrical industry has nothing to fear from that. Having regard to the heavy capital expenditure on street lighting in large towns—in Manchester it represents some £200,000—are not the duties attached to the position such as to warrant departmental independence? The status carried by the added responsibility would, moreover, attract to illuminating engineering men of the type required by the complexity of modern traffic conditions in congested urban areas.

Advertising by Light

IN initiating a discussion on the lessons to be learnt from London's September illuminations, Mr. Percy Good made some suggestions at the Illuminating Engineering Society which deserve consideration. For instance, if advertisers could be induced to refrain from using hoardings and to convert the waste plots of land on which they are usually erected into simple little gardens, floodlighted at night, with a small notice stating who had provided it, they might often find it far better advertising than the disfigurements so prevalent at present. Again, if hospitals and other institutions which attempt to raise money by the use of crude posters on their buildings would allow the latter to be floodlighted, their efforts would probably be more successful.

Educate the Chef

THE slogan "Educate the Housewife" of the earlier days of domestic electrification is producing good results. It is equally important to "educate the chef," and perhaps more urgently so, for the supply man must not allow the combined electric baking and gas or steam boiling idea to gain too firm a footing. That there is strong prejudice among chefs against electric cooking is certain. An address to chefs and kitchen engineers by Mr. S. J. Benham at the Institution of Heating and Ventilating Engineers this week brings the subject to the fore, and we suggest to supply engineers that such educational work should be carried farther. It is as important to secure wholly the large-kitchen business as that of domestic supply. The load to be created in many undertakings may be comparatively small, but there is a strong link between the two fields.

The Dual-purpose Plate

THERE has been a tendency in some quarters of late to dispense with the usual type of dual-purpose grill-boiler often adopted in the normal style of cooker. Economy in consumption is very important, and from that point of view it is difficult to imagine that a case cannot be made for the single-purpose plate designed for the ordinary household. It does not seem likely that the housewife can always arrange for grilling and boiling operations to be carried out simultaneously; there is another important point for consideration, however—economy in space. The disadvantages of a cooker of increased dimensions in order to accommodate the necessary complement of units, with grill and boiler separate, might easily outweigh those of slightly increased consumption. The whole question, of course, is influenced by the design of plate, some interesting comments on which have recently appeared in our Correspondence columns.

Electrical Trade in Argentina. By H. C. Siddeley, M.I.E.E.

Guidance for British manufacturers and exporters

THE Argentine is one of the most important markets for all kinds of electrical plant and apparatus. About one-fourth of its population of 12,000,000 live in the large towns. Generally speaking, they have already acquired the electrical habit, and it is only a question of time and means before everyone will be using electrical methods for both industrial and domestic purposes. Every town, even the smallest consisting of only a group of houses, has its electricity supply; very few have gas-works. There are over 600 electricity supply stations, but fewer than a dozen gas companies.

Buenos Aires, with a population of 2,250,000, has both, but even here many of its districts have no gas supply available. Both systems have to import all their coal, but the electrical

The imposing new " Chade " headquarters

companies have the advantage of being able to use oil as an alternative; this is produced to a considerable extent in the country.

The climatic conditions favour the use of electricity for domestic purposes; yet the household is the only place where gas is a serious competitor. For the greater part of the year it is warm, and in summer it is sufficiently hot to discourage the use of any apparatus likely to make conditions of life less comfortable, such as a gas cooker. This is particularly the case in Buenos Aires, where kitchen accommodation is very limited, and where many families live in flats and do not employ servants.

Gas in Buenos Aires has not the advantage of low price which it enjoys in England, for electricity for cooking, heating, refrigerators, etc., is charged at a flat rate of 1.3d. per kWh against 9s. 10d. per 1,000 cubic feet for gas. Another indication of the favourable prospects for the sale of electrical apparatus lies in the fact that the two companies which exclusively supply the city of Buenos Aires are extending their plants considerably. Next year they will have available a further plant capacity of 220,000 kW, an increase of nearly 50 per cent. on their present capacity.

Small Industrial Requirements

Argentina cannot yet be considered an important manufacturing country; there will be some increase in power load, but most of the extra capacity mentioned must be absorbed by the domestic load. As the number of kWh sold per piece of domestic apparatus is much less than in the case of motors, a large quantity of such apparatus should be required. This makes the market immediately attractive to the makers of domestic apparatus. In all the other large towns the conditions are somewhat similar to those in Buenos Aires, for all are well provided with up-to-date generating plant, to which additions are constantly being made.

The estancias also are equipped with electric light plants; generally these consist of a light oil engine set, fully or semi-automatic. Owing to the troubles experienced with accumulators, the tendency is to favour those systems using a minimum storage capacity. The plants installed are generally small, *i.e.*, from ½ to 1 kW output; the tendency now prevalent to use refrigerators and other domestic electrical appliances in the estancias will increase the size of plant demanded, particularly when conditions in the agricultural industry improve.

Foreign Influence

The chief handicap to the increase of British trade in the Argentine is the foreign ownership of the electricity supply systems. All the large ones and at least one-third of the smaller ones are owned and controlled by foreign interests, and to-day there is not a single British-owned undertaking. Seeing that the greater part of the capital invested in Argentina is British, it is disconcerting to find so important a development as electricity supply entirely in the hands of other countries. In many of the important towns, electricity undertakings were provided by British capital, but these have now all been sold to foreign concerns.

The following are the names and nationalities of the various groups controlling the electricity supply business in Argentina:—1. Cia. Hispano-Americana de Electricidad (Sofina, Brussels); 2. Cia. Italo-Argentino de Electricidad (Brown-Boveri, Swiss); 3. The Electric Bond & Share Corporation; and 4. Cia. Sud-Americana de Servicios Publicos. The following table shows for each concern the plant capacity in Buenos Aires and elsewhere:—

	Buenos Aires kW	Other Towns kW	Total kW
1.	427,000	77,500	504,500
2.	96,350	6,000	102,350
3.	—	115,000	115,000
4.	—	13,500	13,500

No. 1, generally known as " Chade," is the largest company in the Argentine. It has two stations in Buenos Aires; the older one, with a capacity of 300,000 kW, is situated at Doc Sud, and the other, recently built for an ultimate capacity of 500,000 kW, has a present capacity of 100,000 kW, while an extension of 100,000 kW is now in course of erection.

The Chade has recently taken over the Cia. de Electricidad Provincia Buenos Aires, originally a British company, and it has also lately purchased the power station of the Southern and Western Railways, which supplies energy for working the electric lines of these railways. Chade also owns the gas and electrical companies in Rosario and La Plata.

No. 2, generally known as " C.I.A.E." also has two stations in Buenos Aires. One has a capacity of over 100,000 kW, and the other, which is not yet completed, will have a capacity of

Aerial view of the " Chade " super-station

320,000 kW; two 40,000-kW sets are now being erected, and another of the same output is ready for delivery. This company has bought the power station of Bahia Blanca from the Great Southern Railway, and is now completing a new station there. All its plant has been supplied by Brown Boveri and Co.

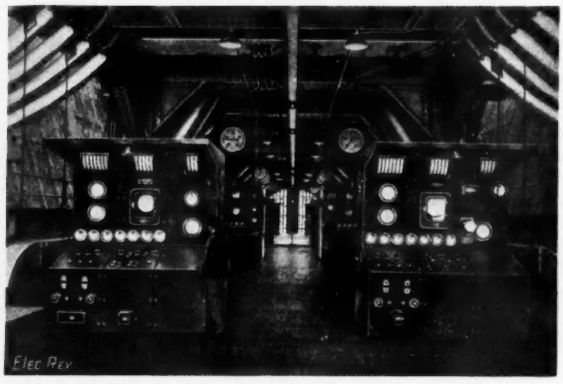
No. 3 is an offshoot of the American and Foreign Power Co. and operates through the Electric Bond and Share Co. It purchased the four stations originally belonging to the Atlas

Light and Power Co. (a British company), namely, Cordoba, Santa Fé, Tucuman & Parana. This company also owns the Cia. Anglo-Argentine de Electricidad, whose works comprise fifty-nine stations averaging about 150 kW each. It has a further fifty small stations throughout the country. This group is closely associated with the American General Electric Co.

No. 4, the Cia. Sud-Americana de Servicias Publicos, owns 100 stations with a total capacity of 13,500 kW. This company is associated with the Westinghouse Co. of America.

Approaching the Public

It is the practice in Argentina for the supply companies to sell to their clients all types of plant and apparatus, usually



Boiler control house

on extended terms of payment. The amounts are collected at the same time as the electricity accounts. Obviously the ownership of these supply companies is a matter of great importance, because of the tendency it produces to purchase apparatus familiar to them, *viz.*, that manufactured in the country of the owners. This tendency is strengthened in the case of three of the above companies, as the capital is provided by corporations which are either owned by manufacturing interests, or are deeply interested in them. The only satisfactory way in which the British manufacturer can combat this disposition to place orders with their associates is for him to appeal direct to the supply company's clients—those who will be the ultimate users of plant and apparatus. This means a much wider general appeal and should be carried out in the same way as any other retail business. The goods must be well displayed in showrooms, which will attract the attention of customers, and which must be staffed with salesmen who thoroughly understand the art of retail selling, and can demonstrate each and every piece of apparatus offered for sale.

In this country manufacturers' showrooms are more often intended for the middle-man, usually a contractor or shopkeeper who sells to the user. In Argentina, there are very few of this class; the manufacturer or his agent, therefore, must take their place, and pursue retail methods for the sale of all types of apparatus, especially that for household use.

There are large stores which sell all kinds of merchandise, etc., but these merely supply the makes of apparatus for which the customer asks. The demand must therefore be created by the manufacturer himself, and he must be prepared to allow such stores special discounts, with an understanding that there must be strict adherence to fixed prices.

Advertising in newspapers, periodicals, etc., is very necessary, as great attention is paid to such displays, and an appeal to a large circle of clients is only possible by this means. Advertising in Argentina is carried out very lavishly, and only a big effort in this direction will be effective.

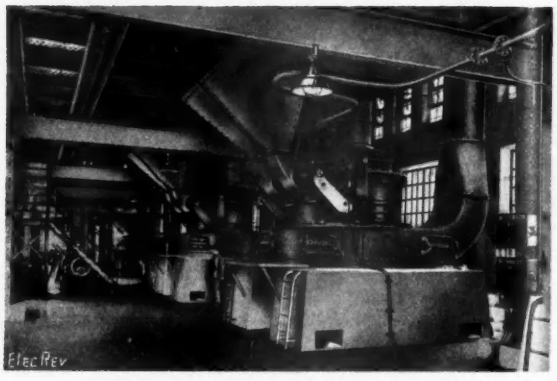
Publicity and Agencies

Distances between the large towns are great, and they therefore cannot be visited so frequently as is done in England. Conditions can be said to be more on the lines of the U.S.A. and the methods used there must be adopted by British concerns in Argentina. Well-printed lists (in the Spanish language, of course), must be prepared and circulated throughout the country. These must be of such a type as to do the work of the ordinary traveller in this country, as in Argentina it is impossible to follow up each inquiry. These lists and pamphlets must in a large measure take his place, and they must therefore be descriptive and attractive, so explaining the apparatus that the purchaser is convinced of its merits. Prices must always be quoted, as so few clients have any exact knowledge on this matter when they first make their inquiries.

Endeavours should be made to cultivate the trade of the merchants who have branch establishments in all the larger towns. Sufficient margin of price must be reserved to the merchant to enable him to meet the necessarily high expenses of his own organisation, and allow him an adequate profit.

The Need for Showrooms

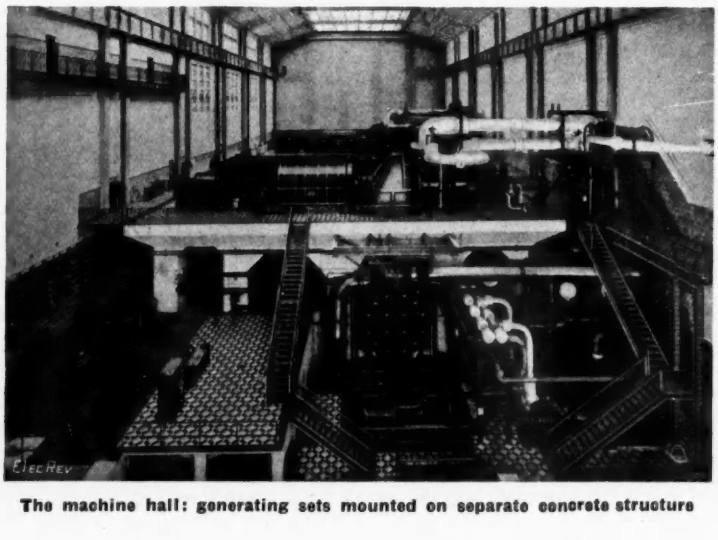
There are many British makers represented in Argentina, but their interests suffer by the relatively small effort possible to each maker, as compared to those made by their chief foreign competitors, such as the General Electric Co. (America), Westinghouse, A.E.G., and Siemens-Schuckert, all of whom have large offices in the principal streets, with extensive and well-equipped showrooms where they can display all kinds



Pulverised-fuel plant at the new station

of plant and apparatus. These are situated in the centre of Buenos Aires and they therefore make a direct appeal to the user, and constitute a very valuable advertisement, a point which is of the greatest importance in that country.

The display of British manufacturers at the recent Exhibition in Buenos Aires has been the finest advertisement that British products have ever had out there and the Argentines have been surprised by their variety and quality. Until this display was made they had not had the opportunity of seeing them exhibited, as there are no showrooms run by British manufacturers equal in size and importance to those of our foreign competitors. The relatively small size of the British manufacturer's business renders it difficult for him to undertake this continuous display, which is so essential to successful competition, but, as a large future business will undoubtedly be the supply of domestic apparatus, purchased by the ordinary householder, no large proportion of this business can be obtained unless some means can be devised to overcome our showroom deficiency. A continuation of the display made at the Exhibition should not be impossible, and its importance to British trade should override many of the difficulties due to divided interests.



The machine hall: generating sets mounted on separate concrete structure

A Combined Effort Urged

The electrical and allied industries, through the B.E.A.M.A., made a splendid effort in their combined interests, by having a stand at the recent Exhibition, and sending out their own special representative. It would, undoubtedly, be beneficial if this effort could be continued, and, through a similar concerted action of the Association, some permanent exhibition could be maintained, the many representatives of the British manufacturers being brought together

to push their combined interests. The sentiment of Argentina would be favourable to such an effort, as everybody appreciates the fact that Great Britain is the country's best customer, but no benefit can arise from this unless Great Britain takes some adequate steps to display and sell its products in the only way Argentina appreciates, viz., by proper display and advertisement.

It must be stressed that it is equally important that British finance should take a more prominent part in the financing of public utilities which can bring important orders to British

The main control room

manufacturers. The employment of finance in such directions as to influence orders for the country of its origin, is becoming most important, as finance and industry tend to become more inter-dependent. Great Britain can only retain her supremacy in finance so long as industry in this country remains sufficiently prosperous to supply through its profits that balance of money which is required for foreign finance.

The American and Foreign Power Company, mentioned above, now has a capital of £110,000,000, chiefly invested in foreign electrical undertakings, which supply electricity to 12,000,000 people in all parts of the world. This concern is generally considered to be closely associated with the General Electric Company of America. Whilst its local purchases are not absolutely confined to American products, there must be a strong tendency in that direction.

During the last three years Great Britain's purchases from the Argentine have reached an average of £70,000,000 per annum, *i.e.*, over one-third of their total exports. This is four times the value of purchases made by the U.S.A., which have averaged only £17,000,000 per annum. On the other hand, the imports into Argentina from the U.S.A. have exceeded those of Great Britain by an average of £7,000,000 per annum. Great Britain supplies rather less than one-fifth of the total imports, but buys one-third of the total exports.

Electrical Trade Figures

In electrical plant and apparatus, the U.S.A. imports into Argentina are 50 per cent. larger than those of Great Britain; the latter have amounted to between £900,000 and £1,000,000 during the last three years. British engineering as a whole occupies an advantageous position in Argentina, in that most of their railways and harbours, and many of their important public works, have been carried out by British engineers. British engineering, also, is well represented by its own Institutions, which are branches of the British Institutions at home. The prestige of British engineering thus stands very high, and should be an advantage to British manufacturers in any trade campaign upon which they may decide to embark.

The Argentine market is there for the British manufacturers. It is a valuable and a growing one, and can be exploited if the proper methods of selling are adopted. Many of these lie within the scope of the manufacturer himself to provide, in order to put himself in as favourable a position as that occupied by his foreign competitors.

Finance and Friendship

Some of his difficulties, such as finance, can only be solved by collaboration with financial houses. There are no insuperable obstacles to obtaining the leading position in the Argentine market, to which our friendly relations and the importance of our trade with them entitle us. A study of the conditions on the spot is necessary in order that manufacturers generally can be guided in their decisions as to the right steps to be adopted. This study could be most advantageously undertaken by a representative of the whole industry who would co-ordinate the individual efforts of agents.

The same conditions which exist in Argentina, are becoming more and more general in all important countries. Argentina, therefore, provides a favourable ground in which some combined action can be undertaken; which, if found profitable in operation, can be adopted in various other countries, modified as may be found necessary.

Economic Conditions in South Africa

A REPORT has been prepared by Mr. N. Elmslie, Senior Trade Commissioner in South Africa for the Department of Overseas Trade (Stationery Office, 2s. net) on economic conditions in South Africa. This states that since the last report (in September, 1929), every form of economic activity has been progressively downwards, and that there is not yet any definite indication of an early improvement. Export trade fell in value by nearly 15 per cent., while import trade dropped by 22½ per cent. The share of the United Kingdom, however, showed a welcome improvement in 1930, for while the value of shipments was considerably reduced, the proportion increased from 43 per cent. in 1929 to 46 per cent. in 1930, and the high proportion was maintained in the first quarter of the current year. Foreign competition has not altered greatly in character or extent, except in the case of Japan, who has greatly increased her trade in both volume and range, and is now supplying an increased variety of goods at prices which no European country appears able to approach.

Considering the commercial imports from all sources, the United Kingdom's share of the whole in 1929 was 41.9 per cent., and the total Empire proportion was 55.9 per cent.; foreign countries supplied 44.1 per cent. The returns for 1930, however, show that although the imports from the United Kingdom were smaller in value at £26,932,326, the percentage rose to 44.75, and that for the Empire to 57.84; imports from foreign countries, in consequence, fell to 42.2 per cent., the share of the United States dropping from 18.9 per cent. to 15 per cent. For the first quarter of the current year returns show that the share of the United Kingdom has further improved to 45.9 per cent.

Imports of Electrical Material

Dealing with imports of electrical material the report shows that electrical machinery and plant from the United States reached a value of £312,857 in 1928, increased to £378,475 in 1929, but decreased to £319,330 in 1930. The value of imports of wireless apparatus, however, showed a continued increase, the figures for the past three years being £13,111, £25,809, and £53,419 respectively.

The imports of electrical cables and wires from Germany increased from £38,633 in 1928, to £59,733 in 1929, but for 1930 the figure dropped to £50,353. Among the items which showed increases during the past year in actual value of shipments was wireless apparatus.

Japan, which is the only important supplying country to increase the value of its imports, has this year added electrical fittings to its variety of goods.

In an appendix analysing the import trade, the report states that the value of imports of electrical machinery after having increased from £6,794,178 in 1928, to £7,882,149 in 1929, fell back to £6,020,654 in 1930. Considerably more than half of the reduction was due to the much smaller importation of agricultural machinery, windmills and small internal combustion engines. Reductions of smaller amount are shown in industrial machinery, boilers and tubes, cranes and electrical machinery. The proportion of the United Kingdom trade in the whole class, which fell from 50.8 per cent. in 1928, to 46.2 per cent. in 1929, rose in 1930 to 54.4 per cent.

Great Britain Losing Ground

The value of imports of electrical plant, machinery, fittings and materials expanded from £2,180,851 in 1928, to a new high level of £2,615,816 in 1929, and declined to £2,232,924 in 1930. A full half of the reduction is accounted for by smaller imports of cable and wire, and a further quarter by a fall in the value of general machinery and parts. Imports of generators and transformers were higher, and those of motors and batteries lower. The United Kingdom share of the trade has been falling since 1925, and in the last three years has been 68.9 per cent., 67.9 per cent., and 66.5 per cent., the loss being greatest in cables and wires, and general machinery and parts. Trade has been fairly well held in generators, motors and transformers, and gains are shown in batteries, both primary and secondary. Imports of heating and cooking apparatus are rapidly increasing, the figures for the last three years being £118,358, £132,738, and £177,712. Unfortunately, the increase in trade has benefited other countries mainly, particularly Canada, the United States, Germany, Denmark, and Sweden. Imports from the United Kingdom have risen a little in actual value, but they form year by year a smaller proportion of the total.

There has been a very rapid increase in the value of imports of wireless apparatus since the introduction of the "all-electric" wireless set. From £83,762 in 1928, the returns jumped to £175,129 in 1929, and £256,873 in 1930, but United Kingdom manufacturers have been slow in putting a competitive line on the market, and the great increase in trade has been secured almost wholly by Holland, the United States, and Germany. Imports from the United Kingdom increased in the three years from £59,918 to £79,983 only, and its share of the trade decreased from 71½ per cent. to 31 per cent.

New Plant at Selected Stations

Extensions of 15,000 kW at Brighton, and 20,000 kW at Stockport

THE generating plant extension which was formally inaugurated by the Brighton Corporation Electricity Department on Wednesday, brings the capacity of Southwick power station up to 50,125 kW, including the 500-kW, d.c. house generator. This station is the only one on the coast of the large South-Eastern Area of the grid to be selected for operation by the Central Electricity Board, and it was necessary that the new 15,000-kW (m.c.r.) set should be available for the load of the coming winter. The tender was accepted on October 23rd, 1930, and the set was started up on September 25th of this year; we have recently had an opportunity of observing that it has thoroughly settled down to its job.

The photographs taken during erection show the stages of the work from March 18th, when the site was cleared, to final completion. It was not possible to remove its predecessor —a 2,500-kW set—before March, as it was required for last winter's load. Incidentally, as an indication of progress made in the design of prime movers during the last twenty years, Mr. W. N. C. Clinch, A.M.I.E.E., borough electrical engineer and manager, told us that the space required for the new set is no more than that occupied by the 2,500-kW set, which was installed in 1912.

The New Turbo-alternator

The turbine is of the three-cylinder, double-exhaust, 3,000-r.p.m. type, made by Richardsons, Westgarth & Co., Ltd. It consists of a high-pressure cast-steel cylinder with impulse stage and reaction blading, an i.p. cylinder with reaction blading, both cylinders being arranged opposite flow to condensate for end thrust, and a double-flow l.p. cylinder with a disc rotor carrying seven rows of reaction blading. In view of the high efficiency (83 per cent.) and the consequent high moisture content (15 per cent.), at the exhaust, the stages of the l.p. cylinder are self-draining. The governing system is of the oil-controlled type without levers.

The condensing plant is of the twin type with closed feed control valve, duplicate three-jet air extraction plant, and duplicate motor-driven condensate pumps, fitted with a closed feed control valve, so that the whole of the feed, whether made up from the evaporator or the surge tank, is de-aerated.

Steam conditions at the turbine stop-valve are 320 lb. per sq. in. and 750 deg. F. Two-stage feed heating up to 250 deg. F. has been adopted and an intermediate bleeding point has been arranged for use when the evaporators now on order have been installed.

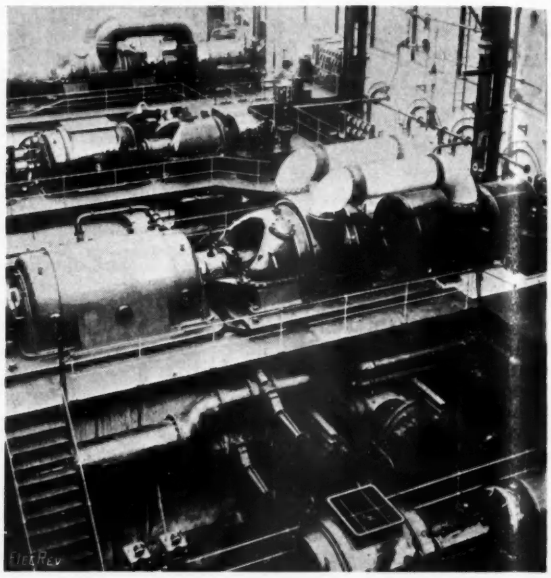
The 8,000-V alternator, by the Metropolitan-Vickers Electrical Co., Ltd., has a fabricated steel stator and is designed to give its full output at 80 per cent. power factor. The guaranteed steam consumption per kWh, under feed-heating conditions, is: at 15,000 kW (m.c.r.), 9.92 lb. with 29.0 in. vacuum; and at 12,000 kW (economic rating) 9.58 lb. with 29.1 in. vacuum.

It is anticipated that one effect of the new plant and other improvements recently carried out will be a reduction in fuel consumption from 1.52 lb. (the best yet recorded) to 1.35 lb. per kWh generated. The present extension has not necessitated the installation of new boilers, as although steam conditions are different—the working pressure has been 225 lb. per sq. in. hitherto—the existing two 60,000-lb. Yarrow and two 77,000-lb. Wood boilers were designed for a pressure of 350 lb. per sq. in. In order to enable the existing 15,625-kW set (see ELECTRICAL REVIEW, May 30th, 1930) to run at the higher steam pressure, it has been reconstructed with a h.p. impulse wheel.

Advantage has been taken of the present opportunity to rearrange the steam piping and segregate the h.p. and l.p. boiler-feed pumps in separate bays in the turbine room. The two systems are interconnected through reducing valves and de-superheaters. Steam-flow and water-flow meters by Geo. Kent, Ltd., have been incorporated for the purpose of ascertaining at all times the performance of the turbines and boilers. Boiler efficiencies of 80 per cent. over a week's working are normal, and 86 per cent. over eight hours has been recently attained. Kent coal with a calorific value of about 13,000 B.th.u. per lb. is used.

Elimination of the Grit Nuisance

In view of reports that have appeared regarding trouble due to chimney emissions from Southwick station, it is very satisfying to record that complaints on this account are now



The new Brighton set

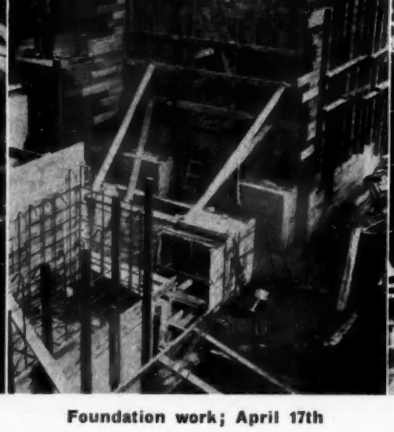
things of the past. The elimination of the trouble is due to the gas washer designed by Mr. Clinch and constructed by his staff. It was installed between the boiler outlet and the induced draught fan inlet. The gas temperature is not reduced to dew-point so that the fan runner is not corroded. An inspection of the salt-water used in the washer indicated where the grit now goes. Within three weeks it is expected that a second washer will be completed for the second Wood boiler, which is now oil-fired.

Another improvement in hand is the chlorination of the circulating water for the condensers with a view to the extermination of mussels, which are here the most common cause of fouling.

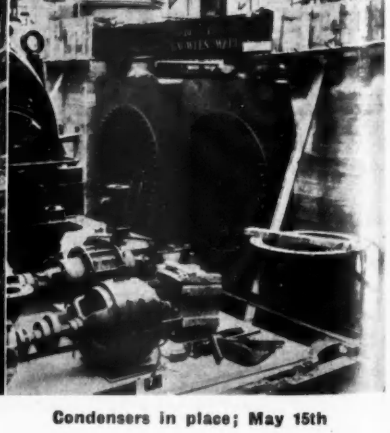
An important new feature of the power station is the laboratory, where coal, oil, etc., are tested. This work is carried out under the supervision of a qualified chemist.

To deal with the increased works-power load, it has been necessary to supplement the present d.c. supplies by a.c. This

Vacant site; March 18th



Foundation work; April 17th



Condensers in place; May 15th

supply, protected by reactors, which has been taken from the e.h.p. bus-bars, is connected through switchgear and transformers to two distribution pillars in the works. The whole of the new work struck us as a particularly good example of a clean lay-out.

The maximum load on the station last winter was 29,300 kW; this includes a supply to the Grid, the Corporation's own consumers requiring 25,700 kW. This year the load has already exceeded 27,000 kW (23,800 kW local).

At the power station and at North Road sub-station, the 350,000 kVA switches controlling the eight 8 kV feeders (the pressure on which is to be raised to 11 kV) are being replaced by 750,000 kVA, M.V. iron-clad gear.

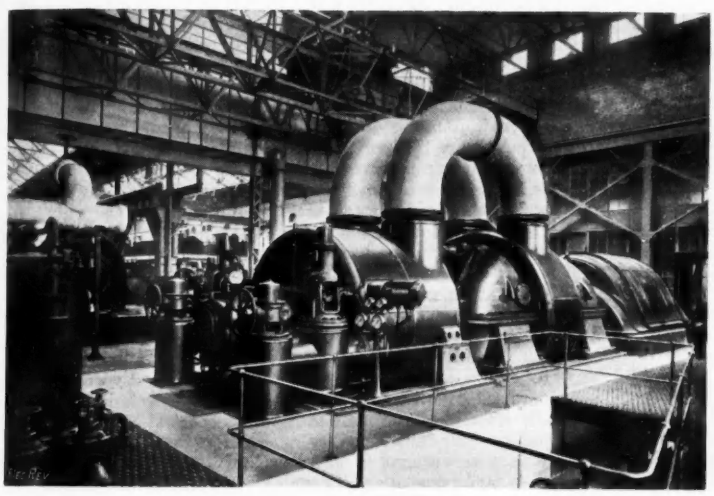
At North Road sub-station there are also six outgoing feeder panels connected *via* six groups of reactors to the M.V. 8 kV sub-feeder cellular-type switchgear, which is being reconditioned to bring its rupturing capacity from 80,000 kVA to 150,000 kVA. A control room is in course of equipment that follows the most recent lines in its general lay-out.

The sub-contractors for the plant under Messrs. Richardsons, Westgarth & Co., Ltd. (who designed the turbine and auxiliaries), were the Metropolitan-Vickers Electrical Co., Ltd. (alternator, switchgear and auxiliaries); Vickers-Armstrongs, Ltd. (condenser shells); the Staveley Coal and Iron Co., Ltd. (circulating water pipe work); Aiton & Co., Ltd. (steam piping); Mather & Platt, Ltd. (extraction pumps); and Bierrum & Partners (foundation work, under separate contract, to the instructions of the engineer to the Corporation).

Extensions at Stockport

RECENT extensions at the Millgate power station of the Stockport Corporation undertaking were referred to in our issue of October 9th. The new plant includes a 20,000-kW turbo-alternator (which increases the capacity of the station to 55,000 kW), four boilers, making the total steaming capacity 490,000 lb. per hour, and new extra-high-pressure switchgear.

The boilers are of the Babcock & Wilcox type, and each installation is complete with balanced-draught stokers, interdeck superheaters, vertical tubular air heaters and a vertical-tube economiser by E. Green & Son, Ltd. Steam conditions



The new generating set

are 375 lb. per sq. in. and 730 deg. F. The balanced-draught stokers are arranged to operate at an air temperature up to 250 deg. F., and are served with coal conveyed from existing overhead bunkers by means of steel chutes to the stoker hoppers; three of the boilers are equipped with traversing coal chutes. Davidson's grit arresters, Babcock & Wilcox's "Diamond" soot blowers, and a full complement of meters and recorders for each boiler, including Kent steam flow meters, CO_2 recorders and distance thermometers, also form part of the boiler equipment. Two motor-driven and two turbine-driven "Conqueror" feed pumps were manufactured by W. H. Allen, Sons & Co., Ltd., and each will deliver 450 g.p.m. against a discharge pressure of 360 lb. per sq. in. The h.p. steam piping, by Aiton & Co., Ltd., incorporates "Corwell" joints and "Aiton" corrugated expansion bends.

The New Turbo-alternator

The turbine-plant extension consists of a two-casing turbine of the Escher Wyss high-effect type, directly coupled to a Brown Boveri alternator, two Escher Wyss surface condensers, and two-stage feed-water heating equipment. The normal full-load of the turbine is 16,000 kW, and the continuous overload capacity is 20,000 kW, 3,000 r.p.m. The h.p. end has two bleeder points, one for feed-water heating, and serving Mirrlees feed heaters, and the other for operating an evaporating plant.

There are two surface condensers of Escher Wyss patent construction, each having a cooling surface of 10,760 sq. ft. The condenser tubes are arranged in nests separated by trays in a slanting position; the trays collect the condensed steam and draw it to the side of the condenser, so that the condensate will not remain in contact with the condenser tubes at the bottom of the condenser, and unnecessary cooling down of the condensate is avoided. Mirrlees air extractors and steam ejectors form part of the condensing equipment.

The alternator was supplied by Brown Boveri & Co., Ltd., and has a maximum continuous capacity of 25,000 kVA, 6,600 V, 50 cycles. A damper winding in the rotor offers protection against unbalanced loading, etc. It consists of copper strips fitted directly below the slot keys and short-circuited by a copper ring under each end-cap. Air cooling is provided on the closed-circuit principle.

E.H.P. and L.P. Switchgear

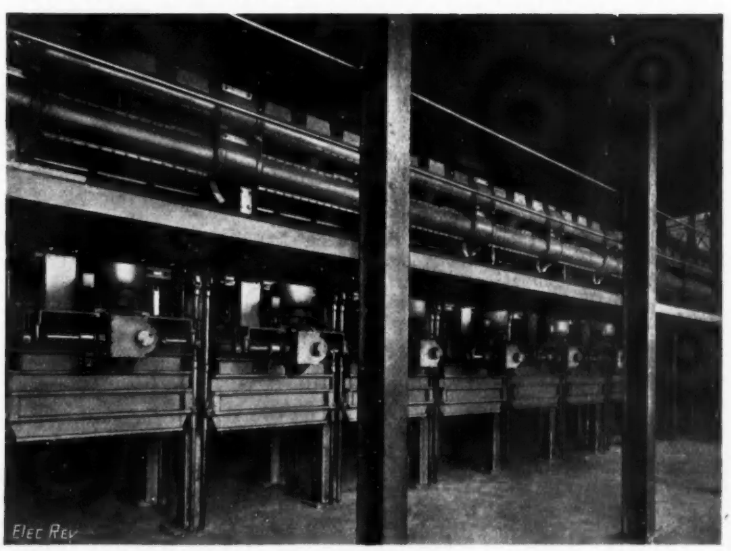
The new e.h.p. G.E.C. switchgear comprises a 6,600-V eleven-panel metal-clad switchboard at the duplicate-bus-bar pattern. The board is connected to the 33,000-V overhead transmission lines through two 10,000-kVA transformers, and controls the 15,000-kW and 20,000-kW turbo-alternators, four 5,000-kVA outgoing feeders, two 15,000-kVA interconnectors to the existing stonework cubicle switchgear, and one bus-bar coupler. Connection to the existing switchgear is through six single-phase G.E.C. air-cooled reactances. The metal-clad switchgear is controlled from a 14-panel remote-control board.

Two panels are employed for the Tirrill regulators for the generating plant, one controls the tap-changing gear for the 10,000-kVA transformers, while the remaining eleven panels control the metal-clad oil circuit breakers.

A new l.p. switchboard was also supplied by the General Electric Co., Ltd., and it is connected to the 6,600-V supply through three 1,250-kVA transformers.

The station is "selected" under the North-West England and North Wales electricity scheme, and in addition to feeding into the grid system it supplies energy to neighbouring urban district councils, etc., throughout an area of about 130 sq. miles.

The town of Stockport is well furnished with supply mains. High-pressure supplies to factories, workshops, etc., are well developed, and the attention of the Department is now being concentrated on increasing the demand for domestic supplies. As an inducement in this direction, a very attractive rateable-value tariff is now



The bus-bar system

in operation, and assisted wiring and hire-purchase schemes have recently been introduced.

The extensions were designed by Mr. Robert Lee, A.M.I.E.E., borough electrical engineer, Stockport, who was recently appointed to fill the vacant position of electrical engineer and manager to the St. Pancras Metropolitan Borough Council (ELECTRICAL REVIEW, October 30th, 1931, p. 681).

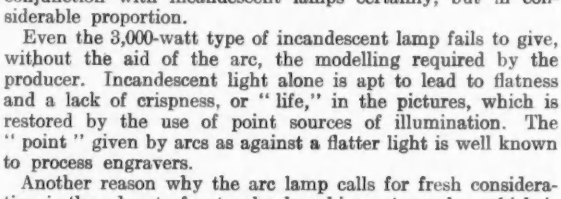
Arc Lamps in Kinematography. By T. Thorne Baker

Spectroscopic control rapidly becoming a necessity

THE arc lamp, once a predominant factor in the lighting of kinematograph studios, showed every indication of disappearing from use when talking pictures came into vogue. The complete silence of the incandescent lamp made it ideal for recording. Recently, however, there has been a decided tendency towards the employment of arcs again, in conjunction with incandescent lamps certainly, but in considerable proportion.

Even the 3,000-watt type of incandescent lamp fails to give, without the aid of the arc, the modelling required by the producer. Incandescent light alone is apt to lead to flatness and a lack of crispness, or "life," in the pictures, which is restored by the use of point sources of illumination. The "point" given by arcs as against a flatter light is well known to process engravers.

Another reason why the arc lamp calls for fresh consideration is the advent of natural colour kinematography, which is



Spectrum Response of Different Films

rapidly coming more and more into use, and may indeed eventually replace black and white to a large extent, as talking pictures have replaced silent ones. In the projection of coloured films, provided they are really natural, the whiteness of the arc flame is of paramount importance, and some sort of standardisation of projector arc lamps will become inevitable, because "whiteness" is such an elastic property.

A number of considerations require study. In the case of projection one wants the maximum amount of white light for a given amount of current consumption. In an average large theatre, with a "throw" of over a hundred feet and a screen probably 18 ft. by 25 ft. in size, this is from 120 to 140 A. If one accepts the condition that the illumination of the arc must be dead white, which will be the more efficient—a plain arc with uncored carbons, or an arc with cored or impregnated carbons, the tint of which is spectroscopically corrected? A good deal of work was done in this matter by Mott(1) some years ago.

The query to-day requires a good deal of amplification. Any form of core or impregnation must impart a tint to the flame, and will spoil the light from a natural colour standpoint. Suppose, for example, that an arc giving a so-called sunlight effect (actually a yellowish light) be used; it would ruin a natural colour film unless so filtered by blue glass as again to become white. Unfortunately any such colour filter will absorb an undue percentage of the light, and thus it can happen that an uncored carbon may be actually more efficient than a cored carbon for the projection of coloured films.

There is a real need for co-operation between electrical firms supplying arc lamps and carbons and the technicians responsible for the illumination of kinematograph studios and theatres. The field is a big one, and should not be lost sight of. Some 7,000 million feet of film was used last year in the taking and projection of motion pictures—the fourth largest industry in the world.

The sensitiveness to white (incandescent) light of an ordinary photographic film is shown by curve A above and that of a film chemically sensitised to colour by curve B. The latter shows that the effect of exposure to white light on the "panchromatic" film (B) is pretty well twice as great as in the case of the ordinary film, through its added sensitiveness to green, yellow, and red. Hence, when panchromatic film is used in the studio half the cost of electricity used for illumination can be saved—an immense economy. Modern films can be made nearly three times as sensitive by panchromatising and using gasfilled lamps, and the result has been that makers of carbons have set out to produce cores which will give light the spectrum of which is very rich in green and red rays. Arcs can thus be used to supplement gasfilled lamps without any loss in photographic efficiency.

(1) Trans. Amer. Electrochem. Soc., 1917, 165.

In taking a black and white picture, all the camera man requires is a picture pleasing in its tones, gradations, modelling, and composition. Provided his illumination and its control are sufficient, and his film of good quality, the spectrum means very little to him. If certain colours photograph better than others, he can get his artists to adopt them. The same applies to make-up, scenery, and so on. But now comes the colour film. Inferior pictures in colour will no longer be tolerated. They must be perfect. The light of the studio must therefore be *white*, and the light used in projection *white* also. What does one mean by *white*?

It is known that the colour of the sun has approximately the same distribution of luminous intensity throughout the spectrum as that of a perfect black radiator raised to a temperature of 5,600°K. It is a great feather in the cap of the electrical industry that the colour temperature of the most recent high-intensity arcs is almost the same.(2) Previously one had regarded the colour temperature of the arc as about 3,800° K, while that of gasfilled lamps is round about 2,360° K. A glance at the set of curves below will indicate (roughly) the great change in the distribution of intensity of the spectrum colours in these sources of illumination, as the temperature of the incandescent body rises from 3,000° K (lowest) to 6,000° K (upper curve).

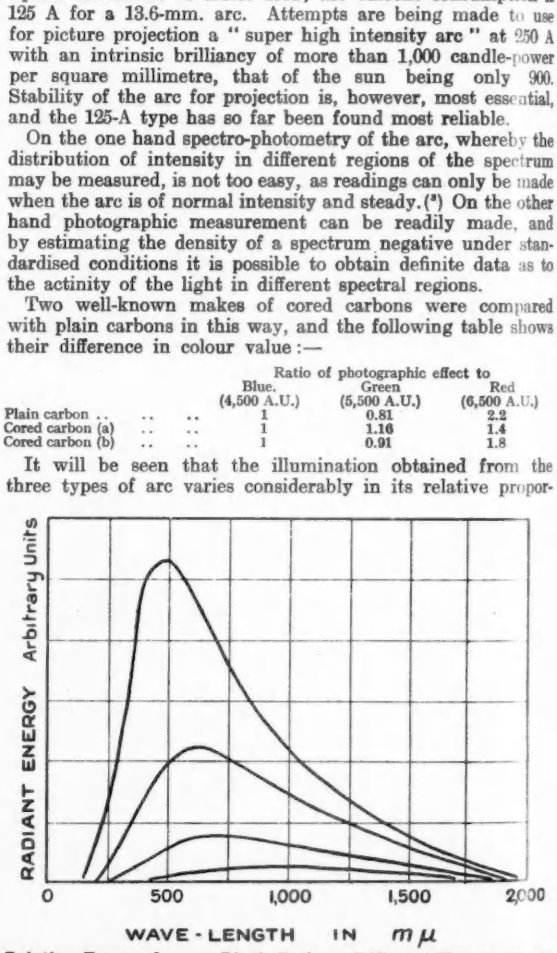
The high-intensity arc with its colour temperature equal to that of the sun is stated to give some 820 candle-power per square millimetre of crater area; the current consumption is 125 A for a 13.6-mm. arc. Attempts are being made to use for picture projection a "super high intensity arc" at 250 A with an intrinsic brilliancy of more than 1,000 candle-power per square millimetre, that of the sun being only 900. Stability of the arc for projection is, however, most essential, and the 125-A type has so far been found most reliable.

On the one hand spectro-photometry of the arc, whereby the distribution of intensity in different regions of the spectrum may be measured, is not too easy, as readings can only be made when the arc is of normal intensity and steady.(3) On the other hand photographic measurement can be readily made, and by estimating the density of a spectrum negative under standardised conditions it is possible to obtain definite data as to the actinity of the light in different spectral regions.

Two well-known makes of cored carbons were compared with plain carbons in this way, and the following table shows their difference in colour value:—

	Ratio of photographic effect to		
	Blue. (4,500 A.U.)	Green (5,500 A.U.)	Red (6,500 A.U.)
Plain carbon	1	0.81	2.2
Cored carbon (a)	1	1.16	1.4
Cored carbon (b)	1	0.91	1.8

It will be seen that the illumination obtained from the three types of arc varies considerably in its relative proportions of blue, green, and red rays—enough to upset any system of colour photography without carefully computed compensation. But it shows, too, that just such compensation will be required when *projecting* motion pictures in colour, if the natural colour balance is to be maintained. The advances recently made in natural colour kinematography at home and abroad will necessitate a very high standard of "whiteness."



Relative Energy from a Black Body at Different Temperatures

(2) Journ. Soc. Motion Pic. Eng., 1931, 66.
(3) Bureau of Standards Technol. Paper, 168, 1920.

Electrical Trading in Australia

Government Policy Again Attacked

BY OUR SPECIAL CORRESPONDENT

FOR many years past wiring contractors and electrical appliance traders in the capital cities of the Eastern States of Australia have sought relief from what they stoutly contend to be grossly unfair competition from Government and municipal departments carrying on operations with many pronounced advantages not enjoyed by private enterprise. I refer to such advantages as exemption from Federal and State income taxes, and municipal and other rates, as well as to the benefit of having a steady stream of account-paying consumers passing through adjacent showrooms.

The recent campaign in Brisbane against civic trading has now achieved complete success. The City Council has decided to close its trading department as soon as practicable, and has made arrangements to lease the premises to the Australian General Electric Co., Ltd., for a period of five years at a rental of £1,250 per annum. The department was losing between £5,000 and £6,000 per annum, and in June last the turnover was £1,100 with a loss of no less than £500.

In Sydney, the Electrical Association of New South Wales, with valuable assistance from other interested bodies, such as the Master Retailers' Association, reached a compromise with the City Council which, while not so favourable as private traders could desire, still represents a step in the right direction and possibly all that can be expected in existing circumstances.

The Situation in Victoria

The Minister for Electrical Undertakings, Mr. Cain, received a deputation last April from the Electrical Federation of Victoria which requested that the State Electricity Commission should desist from its policy of selling appliances which could only have the effect of stifling enterprise and inflicting hardship on the commercial life of the community. The result was unsatisfactory to the Federation, and it recently circularised members of the State Legislature and of the more important municipal councils throughout the State, setting out its objections to the intrusion of the Electricity Commission into the merchandising of electrical appliances and other activities competitive with ordinary trading houses.

The circular stated that several millions of the £20,000,000 capital expenditure had been lost and proceeded :—" The Commission . . . . is engaged in a costly campaign for the sale of electrical appliances, fittings and apparatus, in competition with well-organised private enterprise and in a market already more than well catered for. We claim that, apart from the Commission's exemption from rates and taxes, its appliance sales section is not bearing a true overhead, thus adding considerably to the heavy losses incurred in the supply department. The trade is the first victim of this ill-conceived merchandising policy. The public will be the permanent sufferer. To-day the public is being tempted by offers such as no trader (nor the Commission profitably) can make on a commercial basis."

Support for the Attack

Strong support has been given to the claims of the Federation by municipal councils, the Employers' Federation and the metropolitan Press, notably the Melbourne *Age* and *Herald*. Reference has been made by these and other critics to the forty shops and other premises acquired or rented throughout the State; to the refusal of the State Government to furnish detailed information; to the challenged accuracy of contentions made by the officials of the Commission; to free assistance offered to architects on lighting problems; and to the sheltered position enjoyed by the Commission in exemption from rates and taxation.

In its retail shops throughout the State, the Commission's total turnover in electrical appliances, etc., in 1929-30 was £72,811, which included the result of a particularly energetic stove-selling campaign. As to the free advice on lighting by the Commission's staff of expert lighting engineers, the Institute of Architects is itself opposed to this new departure.

When questioned in Parliament, the Minister for Electrical Undertakings defended the policy of the Commission and asserted that the sale of electrical appliances would not be discontinued; the Commission, he said, was not now carrying out installation work in any of the larger centres, although in some towns it was still forced to do so because " some contractors had not played the game with the public." He admitted that if the Commission had been a private company it would have had to pay in a recent year municipal rates, etc. (but excluding the two income taxes) of the order of £20,900.

The Minister was asked to lay on the table of the House the detailed trading account, profit and loss account and capital account for the two separate years ended June 30th, 1929, and 1930. He refused to comply with the request, and expressed the opinion that the best interests of the consumers and of the State would not be served by furnishing such information. He added that firms with which the Commission competed did not publish inter-departmental trading figures.

Sir John Monash's Defence

Further, a reply was published by the late Sir John Monash, the chairman, referring to the " recrudescence of extravagant criticisms levelled against the Commission of a nature calculated to impair the confidence of the public in the stability and soundness of the Commission's undertaking."

A further extract from Sir John Monash's statement reads :—

" When, however, a responsible body such as the Electrical Federation of Victoria, which pretends to an 'intimate knowledge of the actual facts,' and with, apparently, the sole object of discrediting the Commission, goes the length of circulating among members of Parliament and among municipal councillors what purports to be a solemn and considered statement, condemning the financial soundness of the State electricity undertaking, it seems to me necessary to make a public denial of these extravagant assertions, lest silence be misconstrued into an admission of their accuracy. The Federation has issued a covering letter, a purported summary of the Commission's last balance sheet and a commentary on its financial structure. Suffice it to say that every assumption of these documents is wrong in fact and every inference is totally untenable. Whereas the full facts are available in public documents, the Federation has chosen not only to present them in an incomplete and garbled form but also to draw from them deductions which are entirely unjustified. It may, indeed, be said that the material which has been thus circulated displays such ignorance of accountancy methods as to amount to an insult to the intelligence of those to whom it was addressed."

The Federation asserts that responsible members of the party in power when the State Electricity Commission Act became law have publicly stated that it was definitely never intended by the Government of the day that the Commission should trade in electrical appliances. Relations between the traders and the Commission are far from harmonious, and it does not appear that relief can be expected from the present Government.

[By courtesy of the Director of Australian Trade Publicity.

Sydney Harbour, showing the New Bridge

Clocks and Tariffs. By D. J. Bolton

A domestic tariff in conjunction with a synchronous clock to encourage the development of economic loads

IT was stated of a certain famous doctor that he had discovered at least a score of new diseases besides several methods of curing some of the old ones; and it is to be feared that many of us who write on the subject of tariffs lie under a similar indictment. At the moment in this country it is hardly too much to say that tariffs are a disease—a welter of unrelated and often contradictory systems. And our efforts to cure the disease too often take the form of inventing a new tariff without eliminating any of the old ones. Only with great trepidation therefore does one embark on such a subject, encouraged perhaps by the reflection that the very existence of so many and such diverse methods of charging proves that the ideal has not yet been found. It can be claimed, moreover, that the proposal here made is at once simpler and more equitable than most of those which it is intended to supersede.

Disadvantages of Two Flat Rates

The present article chiefly concerns domestic tariffs, although the suggestions made have applications to industrial consumers also. A glance at the methods of charge in vogue for domestic electricity will show that although the two-part tariff has made considerable advances (the fixed charge being frequently estimated from the house value or size) it is still a very common practice to charge two plain flat rates based purely on the use to which the electricity is to be put. Thus the charge may be from threepence to fivepence per kWh when used for lighting and about a quarter as much when used for heating, cooking, or other purposes.

From the point of view of the consumer this method of charge has disadvantages. It necessitates two complete sets of wiring throughout the house, not only two meters (for whose hire and periodical reading he has, directly or indirectly, to pay) but two sets of switches, fuses, cables, plugs, &c. To some extent this duplication is desirable as it helps to ensure adequate cable sections and correctly proportioned fuses for the two purposes; there are obvious objections to supplying a 3-kW fire and a 40-watt lamp point from the same fuse box. But on other grounds this complete duplication is quite unnecessarily expensive and troublesome. It is a great convenience, for instance, to have at least one floor plug in every room whatever its size or purpose. If this plug can be used indiscriminately for a lamp standard, a fire or a cleaner, so much the better. With the two rate system the householder has two meters to watch, two bills to check, and throughout he is harassed by the feeling that there are two sorts of electricity in the house and that care must always be taken not to use the wrong sort.

The Supply Authorities' View

The disadvantages from the supply authorities' point of view are more serious, for there is a considerable danger that in attempting to develop a non-lighting domestic load the engineer may acquire a thoroughly unremunerative addition. An electric fire which is used only to supplement other heating on cold winter days is hardly a brilliant revenue producer with electricity at a flat rate of ¾d. or 1d. per kWh, yet it is just as likely to come on at the peak period as a factory with a long period load to its credit. To take actual figures, consider a 3-kW fire used occasionally on its full rating but generally on either the 1-kW or the 2-kW switch. If it averages 1½ kW for two hours a day for the six winter months, its revenue at 1d. per kWh will be £2 5s. 6d. If, on the other hand, this had been treated as an ordinary power load and charged for on a two-part tariff, the price could hardly have been less (on a l.v. supply) than £1 per quarter per kW plus 0.3d. per kWh. The bill for the half-year's consumption would then amount to £6 14s., almost three times as much as before.

Period, not Use, the Deciding Factor

It may be said that the power tariff is framed with an eye to a factory load of, say, eight hours a day; a domestic load of two hours a day cannot fairly be thus charged, since so low a load factor would necessarily have a wide diversity with other consumers. But this contention is only fully valid provided the fire users spread themselves fairly well over the twenty-four hours. If they all tend to use fires at about the same time of day there will easily arise a peak, if not on the station, at least on the local sub-station and street mains. A domestic fire rate at one third or one quarter that charged for lighting will then be very difficult to justify on purely economic grounds.

From the wording of some domestic tariffs it almost appears that the kWh knows what it is going to do the moment it leaves the power station, and that, if used for heating, it is a much cheaper affair without that finish necessary in a kWh destined for lighting. Unfortunately, the same cables must carry both, and what matters to the supply authority is not *how* they are used, but *when*. The G.P.O. is perhaps a useful model in this respect, and when one pays for a trunk call one does not get special rates for special sorts of conversation, but special rates for certain times of day.

A Time-controlled Tariff

With these facts in view it is at first surprising that not more has been done in the way of electrical tariffs of this description. The principle is simple and fair, and contains no difficulties for the non-technical public. A certain rate up to a certain time of day, and another rate after this, is perfectly easy to understand and to comply with. The difficulty of course lies in the metering, since time clocks have in the past been somewhat expensive both in first cost and in the labour entailed in winding, &c. It is on this point that a suggestion has to be made.

There are now on the market in this country several makes of synchronous electric clocks which supply Greenwich time from the a.c. mains. Before very long the whole country will be linked to one identical frequency whose constancy can presumably be relied upon. The actual mechanism can in some cases be bought wholesale at a price of something under £1, which is itself no more than the cost of the meter required under a two-rate tariff.

Conditions therefore seem ripe for the development (for domestic a.c. systems) of a cheap induction meter combined with a synchronous clock in such a way as to register at two or even three different rates at different times of day. If the change were effected mechanically by altering the gear train the extra mechanism might be expensive, but if done electrically the arrangement could be quite a simple one.* The tariff might then take the form of a standard rate of, say, fourpence per kWh, with the proviso that units taken from 8 p.m. to midnight were metered and charged at half rate and those from midnight to 4 p.m. at one-third rate or less.

A Suggestion to Meter Manufacturers

As regards the feasibility of doing this, it will be realised that the a.c. supply meter is merely an induction wattmeter operating in an integrating capacity. If the p.d. across the volt coil is reduced to one half, the current being unaltered, the reading will be half what it was. In order to produce this effect it is only necessary to switch in to the volt circuit an equal magnitude of inductive resistance, and this could be done by the electric clock at a particular time each day. Moreover, as the power of this winding is only a few volt-amperes, the switching itself would present no difficulties.

The total cost for such a meter, manufactured in sufficient quantities, should not exceed £3, and, although this is somewhat greater than the cost of two plain meters, the extra could in fairness be passed on to the consumer who would save several times this figure in avoiding the duplicate installation. Moreover, given the clock mechanism, it would be a simple matter to extend the hour and minute spindles so as to show the exact time of day. If the consumer could always check his clocks and watches against Greenwich time merely by glancing at the supply meter, it would go far to overcome the rooted objection he usually has to paying a rent for it.

One difficulty might lie in the development costs of such a meter, since there are two parties concerned neither of whom would wish to move without the other. To turn out a clock controlled meter at a marketable price would be risky without considerable potential demand, and on the other hand the supply authority would hesitate to impose a tariff requiring a meter not already on the market at a suitable figure. Probably, however, an intermediate body such as the E.D.A. might be able to co-ordinate the two simultaneous movements.

Service Rendered

It will probably be said, and with justice, that these remarks on the merits of a time-controlled tariff omit one very vital factor, that of service rendered. The main reasons for charging a lighting rate three or four times that charged for other purposes have their grounding in business rather than in economics. The cost of supply is not in this ratio, but the service rendered may well be so. To put the matter in a sentence: if I am charged sixpence per kWh for lighting I shall not straight away install gas illumination, because even at this price I obtain a very large amount of lighting for my money. But if I am charged more than a penny for heating

* In the case of one meter, of Continental manufacture, a mechanical change is employed with two registers, and this avoids any legal difficulties arising through the dial not showing true kWh. The price of this, however, does not fit it for small domestic installations.

I shall in all probability employ coal or gas. As Mr. E. V. Clark pointed out in these columns quite recently,* it is this fact more than any other that has given us the two-part domestic tariff.

I am far from disagreeing with this; my suggestions are supplementary rather than alternative. Perhaps the subject can be most clearly illustrated by saying that every tariff has three things to answer for, a past, a present, and a future. The past is a matter of economics—what the energy has cost to generate and distribute to the consumer. The present is a question of service rendered—what it is doing for the consumer and what he is therefore prepared to pay. But the tariff has also a duty to the future, and its effect on this must be closely watched. Will it develop new loads and encourage the right kind of consumption, *i.e.*, that which fills up the valleys of the load curve on the mains and the station?

For the first and last of these duties a time controlled tariff is excellent. It can most equitably provide for the costs of the past and it can most effectively guide consumption in the future. It is simple to understand and the most unenlightened consumer can see its justification and can direct his consumption in the direction indicated. But as regards the other point, a plain tariff of the above kind is not so suitable.

A Modified Two-part Tariff

Probably the ideal domestic tariff would be a two-part one, the fixed portion being based on some generally accepted criterion of value such as rating or floor space, the running portion being varied according to the time of day in the manner here described. The fixed charge would then be for the *service* rendered, and could be regarded as equivalent to a high lighting rate since practically every householder who uses electricity at all will use it for lighting. The relatively low running charge would then encourage other forms of consumption, whilst the specially low charge during off-peak periods would make heat storage economical and would very materially fill up the troughs of the load curve. Such a tariff might be as follows:—

(1) A fixed charge of 15 per cent. of the rateable value;
(2) A running charge of 1d. per kWh, reduced to:
  (a) half this price from 8 a.m. to 4 p.m. and from 8 p.m. to midnight during the winter, and from 8 a.m. to midnight during the summer; and to
  (b) one third of this price from midnight to 8 a.m.

The times of day and year could of course be varied according to the district, &c., so as to induce an even load not only upon the generating plant, but upon the transmitting and distributing gear too. The meter itself would make the deductions and would indicate equivalent kWh which would merely have to be multiplied by 1d. to give the running portion of the bill.

Such a tariff is probably as equitable as it can be made in the matter of representing actual costs, and it contains every encouragement for the development of future loads of the right kind. Moreover, although it may at first appear somewhat elaborate, it is not actually complicated since it involves no technicalities or quantities outside the every-day experience of the layman. "Load factor" is a mystery to him, "maximum demand" an enigma, but if you tell him that from 4 to 8 p.m. in the winter months electricity is more expensive to supply and should therefore be consumed in moderation he can understand and he can act accordingly. Moreover, electricity is dearer then for exactly the reason that trunk calls are dearer in the day-time, or seaside lodgings in August—because there is a greater demand and a limited supply.

* "Ethical Tariffs," ELECTRICAL REVIEW, August 14th, 1931.

New Books

The Electric Trolley-'bus. By R. A. BISHOP. Pp. 193; figs. 58. London: Sir Isaac Pitman and Sons. Price 12s. 6d. net.

Mr. Bishop's book is the work of an enthusiast and makes interesting reading. First, the needs of present-day passenger transport are discussed, and the trolley-'bus is compared with its competitor—the petrol 'bus—and also with the tramcar. Comparative working costs of the trolley-'bus, the petrol 'bus, and the tramcar are given, together with a detailed analysis of the working costs of a large trolley-'bus system. The chassis is not dealt with in great detail, as the author explains that the chassis of the trolley-'bus follows the general practice of that of the petrol 'bus. The electrical equipment is discussed rather superficially and not with the detail one would have expected in a book devoted solely to the trolley-'bus. The important subject of regenerative braking is considered, but few details, and no diagrams, are given. Although some of the troubles experienced in the earlier days when regenerative braking was used on tramways have been overcome by the modern ventilated interpole traction motor, there are still a number of features which can cause trouble; it is the precautionary measures which are adopted to prevent these troubles that are of interest to the electrical engineer. Some of these measures are briefly touched upon by the author, but others are not mentioned. Attention is drawn to a number of anomalies and contradictions in the Report of the Royal Commission on Transport.

We can recommend the book to transport managers and engineers wishing for details of the system, who will find useful the details of costs of conversion of an existing worn-out tramway system to trolley-'bus operation.

The Revised Callendar Steam Tables (1931). Published for the British Electrical and Allied Industries Research Association. Pp. 56. London: Edward Arnold & Co. Price 12s. 6d. (with thumb index), and 10s. 6d. (without index).

This edition supersedes the 1924 edition of "The Enlarged Callendar Steam Tables." In the 1924 edition five tabulated sets of data were given relative to the properties of steam. In the new edition the tabulated data is in three tables. Table I gives the properties of low pressure dry saturated steam and water at saturation temperature from 29.6 in. of mercury vacuum to 30 in. of mercury positive gauge pressure (0.2 lb./sq. in. absolute to 30 lb./sq. in. absolute). Table II deals with the properties of dry saturated and superheated steam for pressures from 1 lb./sq. in. absolute to 4,000 lb./sq. in. absolute, and for temperatures from the saturation temperature to 800 deg. F. at the low pressures and to 1,000 deg. F. at all pressures above 65 lb./sq. in. absolute. Table III gives the values of $P^{3/13}$ for use in the approximate formula for the adiabatic heat drop of steam initially and finally dry. All the tables are based on Fahrenheit units.

In table II pressure progression varies according to the range being 1 lb. per sq. in. from 1 to 20 lb. per sq. in. absolute and 200 lb. per sq. in. from 2,000 to 4,000 lb. per sq. in. absolute. The temperature progression in the same table is in steps of 10 deg. F.

The properties intermediate to those tabulated for each pressure or temperature progression have to be found by interpolation, and to facilitate this the last column on each page of the tables is repeated as the first column on the succeeding page. Examples of methods of interpolation are given in the fore part of the book. The preface consists of six pages, and also deals briefly with the system of equations formulated by the late Professor Callendar and his co-workers. In addition, a table is incorporated giving the usual reduction factors for Fahrenheit, Centigrade, and metric units, etc.

In the 1924 edition table II gave the values of Sh, H, H-B, V, ϕ for each tabulated pressure and temperature. In the new edition only the values of H, V, ϕ are given.

The tables are well arranged on good paper, and the printing is clear and easily read. The 1924 edition measured approximately 5½ in.×8¾ in., a handy size. The new edition measures approximately 8¼ in.×11¼ in.

Principles of Electricity. By L. PAGE and N. I. ADAMS. Pp. xii+620; figs. 319. London: Chapman & Hall. Price 21s.

While the basis of this book is theoretical, the authors have devoted considerable space to the theory of electrical measurements in d.c. circuits and to bridge measurements in a.c. circuits. The book is well illustrated, and there is a good selection of problems for solution by the student. We can hardly commend the authors' choice of symbols in adopting "*i*" for the imaginary unit when writing on electrical theory, as the use of the same letter is almost necessary to denote current. The mathematical text in the book is rendered the more difficult to follow by the appearance in an equation of two slightly different forms of the same letter, each form bearing a totally different meaning from the other. With this slight reservation, we can say that the authors have presented a difficult subject with a degree of simplicity which is very meritorious, and, on this ground the work will be found useful by practising engineers who are desirous of including in their technical library a comprehensive book on electrical theory.

To describe such a work as an elementary text-book is misleading, at least to prospective English purchasers. A thorough grounding in mathematics up to and including a good knowledge of partial differential equations is quite essential for an intelligent reading of the work.

An Outline of the Universe. By J. G. CROWTHER. Pp. xviii+376; figs. 150. London: Kegan Paul, Trench, Trubner & Co., Ltd. Price, 12s. 6d. net.

The author of this book develops his story so as to give a very good idea of the electronic theory of matter and of the usually accepted idea as to the nature of electricity. These subjects are of interest to us all and, of course, of actual value to the research worker and the inventor. Once the exact idea of the nature of electricity is obtained it becomes a far simpler matter to find ways and means whereby its various manifestations and applications can be developed, while in another realm of science, a knowledge of the molecular structure of the materials used in engineering construction is of great value in investigating the behaviour of those materials in service.

We are able to commend the book as being as good a presentation of so vast a subject as could reasonably be expected within the compass of 376 pages. We confess to having read it throughout with real pleasure.

Concentrating Short Radio Waves. By N. Wells, M.Sc.

The function of the beam system

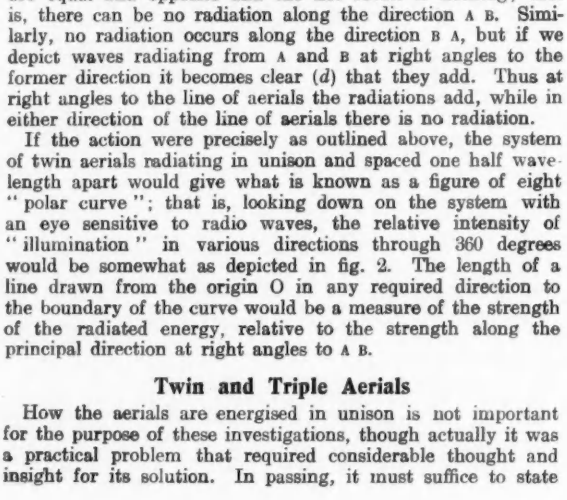
HAVING discussed the appropriateness of certain wavelengths for day, night, and seasonal conditions and also various distances,* and seen how the form and height of both transmitting and receiving aerials employed have a very definite bearing on the efficiency of reception and signal strength,† we will now explain how the beam system concentrates energy and directs it as determined by the designer towards some corresponding receiving station.

As a preliminary, picture in plan (see fig. 1) two identical vertical aerials spaced one half wavelength apart; that is, they will figure as two dots separated by the distance occupied by either the ridge or the depression of the desired wavelength. If each aerial be energised separately and yet in synchronism of phase, we get a system of twin aerials radiating waves that ebb and flow independently and yet are in absolute unison. Thus at (*a*) in fig. 1 a wave may be drawn from A in the direction B, and at (*b*) a wave from B in the same direction; at (*c*) the two waves are drawn together and it is obvious that there is cancellation of energy to the right of A, for a positive ridge is superimposed on a negative depression, so that at any point in the direction A B the actions at a given instant are equal and opposite and the net result is nothing; that is, there can be no radiation along the direction A B. Similarly, no radiation occurs along the direction B A, but if we depict waves radiating from A and B at right angles to the former direction it becomes clear (*d*) that they add. Thus at right angles to the line of aerials the radiations add, while in either direction of the line of aerials there is no radiation.

If the action were precisely as outlined above, the system of twin aerials radiating in unison and spaced one half wavelength apart would give what is known as a figure of eight "polar curve"; that is, looking down on the system with an eye sensitive to radio waves, the relative intensity of "illumination" in various directions through 360 degrees would be somewhat as depicted in fig. 2. The length of a line drawn from the origin O in any required direction to the boundary of the curve would be a measure of the strength of the radiated energy, relative to the strength along the principal direction at right angles to A B.

Twin and Triple Aerials

How the aerials are energised in unison is not important for the purpose of these investigations, though actually it was a practical problem that required considerable thought and insight for its solution. In passing, it must suffice to state



that the aerials are supplied from one transmitter through a system of branch feeders, so arranged that each aerial is energised in synchronism.

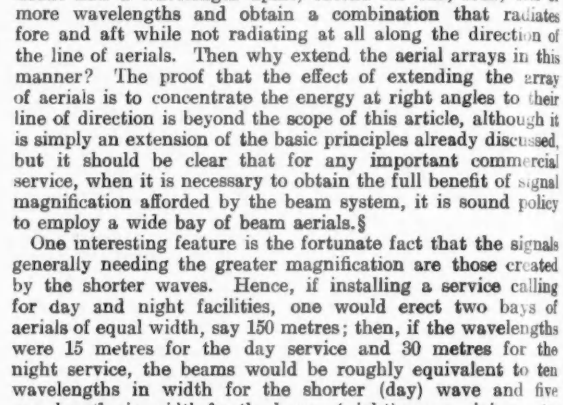
Returning to the twin aerial system, unfortunately the principle outlined does not carry us far enough, because it neither explains why beam systems have a row of aerials that are often ten wavelengths long, nor does it satisfy the condition of a row of three aerials, such as A, B and C in fig. 3, with a third aerial added one half wave away from B. Taking the last difficulty first, if we attempt to add up three waves in the direction A B C we will find that, as shown at (*a*) in fig. 3, while A and B cancel out as before, C is left without any equal and opposite wave to neutralise its radiation in the direction A B C; yet it is an experimental fact that three such aerials form a system that practically does not radiate along the line of aerials. The reason is that one cannot treat three points of radiation as separate entities. Aerial A cannot radiate without affecting aerial B; also aerial B affects A and C, while C affects B; in fact, the space between A, B and C becomes "alive" and for electrical purposes the relations between these aerials are as if they were replaced by a whole row extending from A to C and spaced very close together, each one radiating a proportionate share of the total supply of energy. We may even go further and state that for such a system of aerials the distance A to C becomes, in effect, a radiating surface. With this necessary modification we can assume the three aerials to have been replaced by a large number of aerials extending from A to C and, if we now take the trouble to draw a number of wave curves for all the little aerials behind C and add the result in the direction A C, we shall find that the total effect is cancellation of energy, see (*b*) in fig. 3.‡

The Directional Effect

Thus we may make a system of aerials, spaced in practice about half a wavelength apart, extend for one, four, ten or more wavelengths and obtain a combination that radiates fore and aft while not radiating at all along the direction of the line of aerials. Then why extend the aerial arrays in this manner? The proof that the effect of extending the array of aerials is to concentrate the energy at right angles to their line of direction is beyond the scope of this article, although it is simply an extension of the basic principles already discussed, but it should be clear that for any important commercial service, when it is necessary to obtain the full benefit of signal magnification afforded by the beam system, it is sound policy to employ a wide bay of beam aerials.§

One interesting feature is the fortunate fact that the signals generally needing the greater magnification are those created by the shorter waves. Hence, if installing a service calling for day and night facilities, one would erect two bays of aerials of equal width, say 150 metres; then, if the wavelengths were 15 metres for the day service and 30 metres for the night service, the beams would be roughly equivalent to ten wavelengths in width for the shorter (day) wave and five wavelengths in width for the longer (night) wave, giving automatically the greater concentration where conditions require it.

The actual degree of concentration as between systems of aerials one wavelength and ten wavelengths wide, respectively, is indicated in fig. 4 (*a*) and (*b*). It should be clearly understood that the power input is the same in each case, so that the polar curves indicate very fairly the gain in concentration obtained by a system ten wavelengths wide as compared to a system only one wavelength wide.


DIRECTION OF RECEIVING STATION
10 WAVELENGTHS
(b)
Fig4
½ WAVELENGTH
10 WAVELENGTHS
(a) POLAR CURVE FOR A BEAM AERIAL 10 WAVELENGTHS WIDE.
Fig5
(b) POLAR CURVE FOR A BROADCAST AERIAL TRANSMITTING THE SAME POWER AS (a): IT WILL BE OBSERVED THAT THE POWER IN THE REQUIRED DIRECTION IS MUCH GREATER WITH THE BEAM SYSTEM.

It remains to deal with the fore and aft radiation, produced by the above system of aerials, in such a manner that radiation occurs in one direction only. But we have already dealt

* ELECTRICAL REVIEW, July 17th, 1931.
† ELECTRICAL REVIEW, September 11th, 1931.

‡ This argument may not satisfy the inquiring mind, because it must be apparent that as drawn in fig. 3 (*b*) the wave from the last dot is not cancelled, though to avoid confusion this has not been indicated. The answer to such an objection is that we may indefinitely increase the number of aerials to such an extent that the amount of radiation from any individual aerial, in this particular example the aerial C, can be ignored when compared with the total radiation.

§ For a graphical method of study see ELECTRICAL REVIEW, May 25th and June 1st, 1928.

with this aspect under the heading of "Reflection," for if we erect a second row of similar aerials one quarter wavelength behind the first row they will react as a reflecting system, turning the aft beam round and adding it to the forward beam, so that the system will radiate the whole of the energy in the direction of the receiving station.

In fig. 5 (*a*) the polar curve is drawn for a reflected system ten wavelengths wide; note that the reflector is shown at threequarter wavelength spacing, a distance often adopted as giving slightly better results than one quarter wavelength spacing. The directional gain between fig. 4 and 5 is obvious, and the difference is still more impressive when compared with an omni aerial radiating the same total power, see fig. 5 (*b*).

Design of Beam Aerials

Generally when erecting a beam aerial the supporting towers are carefully lined out so that the system is at right angles to the great circle passing through the two corresponding stations, but it should be mentioned that there are a number of cases in which the beam is "swung" through several degrees away from the direction at right angles to the line of aerials; the method adopted is quite simple, being based on a proportional adjustment between the lengths of the aerial branch feeders.

The great concentration in energy obtained by the beam system at once gave radio communication a status it had not previously enjoyed, for, by virtue of the strength of the received signals, high-speed reliable communication became possible between all places on either hemisphere where beam installations were erected.

Two other very important advantages are, first, when employed at the receiving station it not only gives the equivalent of great amplification, but also screens the receiving circuit from jamming and from atmospherics in all directions other than the direction for which the aerial system is lined out; similarly, a beam transmitter is comparatively free from the sin of jamming stations outside the path of its intended activity. Secondly, a beam receiving system acts in some way as a "tank" and tends to average results during periods of fading, not simply by magnifying the weaker signals, but also by integrating the signal strength across the front of the line of aerials.

Advantages of the Beam

Summarising advantages, we have concentration, which is equivalent to very effective signal amplification; elimination of interference, either from atmospheric sources or from other stations (jamming); anti-fading properties. There is also economy of space in the ether and a certain amount of secrecy, due to the signals being concentrated in one direction.

In the main we owe the beam aerial to Mr. C. S. Franklin, of Marconi's Wireless Telegraph Co., Ltd. Once the merits of his system were established, development on similar lines followed in America, Germany, and France. The fact should not be overlooked that the success of the rapidly growing international radio-telephone links is largely due to the advantage of beam receiving and transmitting aerials.

Wireless Research

WITH the completion of ten years' investigations the Radio Research Board of the Department of Scientific and Industrial Research has reached a definite stage in its work.* Apparatus and methods capable of yielding reliable and consistent results have been devised for the study of the fundamental problems connected with the propagation of waves, the nature and origin of atmospherics, and radio direction-finding; in addition, considerable progress has been made in the improvement of methods for the measurement of electrical quantities at high frequency.

The Board suggests that the laudable desire for immediate results for practical application should not be allowed to divert too much energy from fundamental research. Much of the latter needs organisation on a scale which is impossible within the confines of a University laboratory, and the Board consequently feels that it must continue such fundamental work, although priority may in certain cases be given to experiments whose immediate application is clear. The proportion of time and money spent on experimental application therefore requires the closest scrutiny.

Closer Collaboration

It is announced that financial arrangements have been made for closer collaboration between the Post Office and the Board, and the fighting services, and other users of radio-telegraphy might make similar increased use of the Board's resources with advantage. To fulfil the additional responsibilities entailed, some increase in staff and facilities will be necessary.

During the year close collaboration has been maintained with the Radio Research Boards appointed in Australia and New Zealand by their respective Governments.

The general programme of work being pursued mainly follows that of previous years. Priority is, however, being given to the study of waves below 10 metres, and under the arrangements with the Post Office an investigation is being undertaken to test the communication possibilities of such waves.

Professor Appleton's Work

Full use has been made during the period under review of the frequency-change method developed by Prof. E. V. Appleton for the study of the ionisation of the atmosphere and its effect on the propagation of waves. The data obtained from the lengthy series of observations carried out at Peterborough, Cambridge, King's College (London), and later at Slough, have been fully analysed, and deductions reported concerning (*a*) the existence of more than one ionised region of the upper atmosphere, (*b*) the possible influence of magnetic storms on atmospheric ionisation, (*c*) the gradient of ionisation in the upper atmosphere and its alteration under solar influence at sunrise, and (*d*) the actual height reached by waves deviated in the upper atmosphere. The reflection coefficient of the ionised layers in the atmosphere with the angle of incidence of the atmospheric rays has been determined, and the absolute magnitude of the average value of downcoming waves at different distances from a broadcasting station obtained. These figures have been used by the British Broadcasting Corporation as part of the data on which the prediction of the service areas of stations in its regional scheme is based.

A considerable amount of work is now being carried out on waves below 50 metres, and has already produced evidence relating to the influence of magnetic storms on the ionised layer. For example, on the occasion of a magnetic storm the ionisation at the height of about 120 km. is frequently sufficient to reflect 50-metre waves which normally penetrate at vertical incidence to a very much greater height, thus indicating a marked increase in ionisation from the normal value. The ultimate object of the present studies of the effect of the ionisation of the atmosphere on the propagation of waves has now definitely emerged as being the quantitative determination of the mean distribution of ionisation at different levels in the atmosphere. Experiments now in progress point to the possibility of realising this object.

Aerials and Direction Finders

The study of aerials has been continued at the National Physical Laboratory, and a graphical method has been developed for finding the magnitude and phase of the electrical field in the immediate neighbourhood of an aerial carrying a known distribution of current. "Aerial shadow" has been investigated by measuring experimentally, at different points, the variation in the signal strength of a local transmitter caused by the interposition of a receiving aerial between the transmitter and the points at which the measurements were made, and a satisfactory theoretical explanation of the experimental results has been obtained. This investigation is likely to be of value in the design of reflector systems at beam stations, and the results will shortly be published.

With regard to direction finders, work is proceeding in an attempt to make the Adcock system free from night errors; apparatus is being devised for use with 12 to 60 and 10 to 5 metre waves, and on behalf of the Air Ministry a direct-reading instantaneous direction finder, employing the cathode-ray oscillograph, is in course of development.

Photographing Atmospherics

The most noteworthy advance in the study of atmospherics during the year has been that, with the new cathode-ray oscillograph developed by Baron Manfred von Ardenne, it has proved possible to photograph the wave forms of atmospherics previously observed visually. It is satisfactory to note that, thus far, the general nature of the forms recorded photographically is in agreement with the results of previous visual observations. A new recorder in which the "resolving power" in respect of simultaneous streams of atmospherics, arriving from different directions, is very greatly increased is to be issued to suitable observing stations in this country and overseas.

"Fultograph" picture transmissions for recording the range of atmospherics are yielding satisfactory results; they show broadly that a very great preponderance of atmospherics are received nearly simultaneously at all the observing stations, scattered over the British Isles and Europe, where the receiver sensitivity is sufficient to reveal them.

Radio-frequency Standards

The development of radio-frequency standards has been continued at the National Physical Laboratory, and a considerable amount of research has been carried out on the use of tuning forks and quartz crystals for controlling frequency. With the two tuning forks forming the National Physical Laboratory standard it is expected that constancy of frequency at any instant will be maintained to an accuracy of one part in one million. Experiments are also being made with a quartz oscillator for use as a standard of frequency of 1,000 cycles per sec. as an independent alternative to the tuning fork.

*Annual report for 1930 published on November 2nd; H.M. Stationery Office, price 2s. net.

MEETINGS AND DISCUSSIONS

A Review of Current Topics and Opinions at the Institutions

Coil v. Magneto Ignition

DURING the last ten years the battery-energised coil-ignition system for internal-combustion engines has made considerable headway, both in this country and on the Continent, and it is fitted to at least 80 per cent. of the motor cars now being produced.

The chief reasons are the lower cost of the coil system for multi-cylinder engines, the avoidance of difficult problems in the driving of the ignition unit and in the choice of a suitable type of magneto for high-speed engines of six or more cylinders. In addition, the growth in the use of electrical auxiliaries, with the consequent necessity of an adequate and properly-maintained battery, has largely removed the great drawback of all coil ignition systems, namely, their dependence upon the battery for the supply of the energy necessary for starting purposes.

In a paper read at the INSTITUTION OF ELECTRICAL ENGINEERS on November 5th, Mr. E. A. Watson outlines the fundamental conditions underlying the design and performance of coil ignition systems and indicates the limits which exist to speed of operation and performance under given conditions. He shows particularly in what way these conditions may be different for European cars, with their high-speed engines and 12-V systems, as compared with the lower-speed engines with which 6-V systems have been operated successfully in the United States for many years past.

At the present time no difficulty is encountered in meeting the conditions laid down by the user of the apparatus. The present problems of the manufacturer are primarily detail ones covering small points conducive to cheapness in manufacture and reliability in operation, and it does not appear that any radical change in design is likely to occur in, at all events, the near future. At the same time, should conditions of working become more onerous, modified systems exist which can doubtless be developed to meet any possible requirements. Perhaps the biggest outcome which can be hoped for from this paper is that, as a result of the applications of the principles laid down, it may be possible to arrive at a better utilisation of material in existing types of coils, with a saving in production costs.

An ingenious method of determining coil performance with the aid of the e.m.f. wave-form produced when a current is broken in an inductive circuit shunted by a resistance (described in an appendix to the paper) is due to Mr. J. A. Laird.

Are Engineers Given Their Share in Management?

IN accordance with custom, Capt. J. M. Donaldson, M.C., president, opened the INSTITUTION OF ELECTRICAL ENGINEERS' first informal meeting of the session on October 26th. He answered the above question with an emphatic "No!"

Did an engineer necessarily make a good manager? he asked. The quality most desirable was ability to handle men; the more important the job the more it was required, men being the tools with which a manager worked.

Next he put vision; any live industry was fluid, and its trends must be recognised, or even anticipated. He thought some technical knowledge of production was essential, but that did not mean practical skill. Then sound financial and economic sense was needed. Few managers were taught; they were generally of the accountant class. No good engineering could be carried on without consideration of costs, and without business aptitude an engineer might provide extravagant margins, or tolerances, that were not sound engineering. The conditions of electricity supply were so unusual that all too often directors and electricity committees had little understanding of the engineer's problems.

Mr. E. S. Byng thought that the engineer was not getting his share of management, and was still less likely to get it in future, for the amalgamation and rationalisation of industry were creating new conditions that would require special aptitude more than ever. Classes and lectures had been inaugurated at the London School of Economics and at one or two universities for the study of industrial management.

Mr. J. F. Shipley said that the road to management was very often reached by successfully carrying out some large erection contract, and Mr. P. Dunsheath maintained that there was no reason why specialised knowledge of engineering should be a handicap, any more than it was a disability to be a lawyer or an accountant.

Mr. S. B. Jackson thought that among the qualities necessary for successful management, the first was indomitable courage, and ability to market one's services stamped a man as a suitable person to manage the larger affairs of a firm. Those were two qualities that a course of study could not supply.

Floodlighting Well Worth While

THE floodlighting of prominent public buildings on the occasion of the recent International Illumination Congress and the Faraday Centenary Celebrations was an attempt to demonstrate to both foreign visitors and Londoners themselves that London could show itself to advantage at a relatively small cost, and the public appreciation of the result was so spontaneous that all who undertook the work free of charge must feel satisfied with their public-spirited action.

The lessons to be learned from the effort were the subject of a paper read by Mr. P. Good before the ILLUMINATING ENGINEERING SOCIETY on October 30th. Have the trouble and expense been worth while? Evidence is available that very satisfactory business resulted to many people. That was not the organisers' primary purpose, but improved business is essential to social development. Very large numbers of extra passengers were carried by the transport authorities, a number of other industries benefited, and what looked likely to be one of the worst Septembers on record became for many in London a good one.

Money Well Spent

Large sums are frequently spent on the architectural decoration of the façade of an important building, which can only be seen by daylight. For a small additional expenditure suitable lighting equipment could be installed and endowed in perpetuity to render the beauties of the building visible by night as well as by day; £5,000 would equip and endow in perpetuity the proper lighting of the façade of the National Gallery and £10,000 the clock tower of the Houses of Parliament.

The illumination of stretches of landscape, or trees and flower-beds in the parks, and the provision of suitable pavilions from which the views could be seen and enjoyed whilst tea or coffee was being partaken of, would seem to be an amenity of value, and the landscape lighting need not then cost the public purse a penny piece.

Day and Night Aspects

The angle from which a building is looked at and the reflecting values of the surfaces vary with time in a way that the architect cannot foresee with any exactitude, so that architectural decoration is necessarily a compromise, and no one will accept the criticism that because artificial lighting is in a different direction from daylight it is necessarily wrong. The

Two Models (Westminster Clock Tower and British Museum) prepared by Mr. P. Good for demonstrating floodlighting effects

direction of lighting is, however, quite important and, by the exercise of control over it, the best results are to be attained. The necessity for the architect to secure the services of the lighting expert to assist him to design the floodlighting for his buildings is very apparent.

While the author prefers the third dimension (distance) to be pronounced, he would not consider that a building so floodlighted as to produce a flat effect was necessarily bad. Each installation must be considered in relation to others nearby and to the street lighting. They must refuse to look upon the venture of last September as merely a "stunt" show. It was the beginning in London of a normal development in the life of the city. Floodlighting is not a mere utilitarian or commercial means of illumination. It is an opportunity.

With a set of miniature projectors and the models illustrated on p. 702 Mr. Good showed the effects produced by horizontal light and the difference between that and lighting from below or above. It was horizontal lighting, he explained, that made the west front of Westminster Abbey look flat. By means of models architects of the future could study the effect of floodlighting before they completed their designs. Five architects who took part in the discussion that followed agreed that in many cases the floodlighting of buildings was cruel to architects.

Is Electrical Education Adequate?

TO all classes of electrical workers a proper education is of the greatest importance, Lieut.-Col. H. E. O'Brien told members of the Irish Centre of the INSTITUTION OF ELECTRICAL ENGINEERS, when he delivered his inaugural address, as chairman, at Dublin on October 29th.

There should be no room in any trade for the indifferent workman. Seven years of ordinary apprenticeship is no guarantee of skill or intelligence.

Indifferent Scientist or Superfluous Teacher?

For a proportion of those destined to take their places in the higher ranks of industry a considerably longer period at the University and a wider range of subjects seemed desirable, but such an extension of the period of University education will probably not effect its object, namely, that of producing young leaders of industry with a far wider range of knowledge than is usual to-day, unless employers co-operate in the scheme and allow such students "sandwich" periods of six months at the works. Unless there were some such plan as this the student might tend to lose touch with the realities of business, and either become an indifferent scientist, or be added to the already overcrowded ranks of the teaching profession.

One of the most promising careers in this country is that of electrical contracting, for there is much work ahead of the profession for some years to come.

Importance of the Irish Domestic Load

There is not much hope of cheap electricity as an isolated factor attracting industrial enterprises to our shores, because, except in the case of electro-chemical industries, which, incidentally, require the minimum of labour in proportion to their size, the cost of power is a very small fraction of the total cost of production. But the field of possible consumers is still large, and the work of the Electric Supply Board and of the electrical contractor and consulting engineer will be incomplete so long as there is a turf fire, a coal range, a paraffin lamp, a gas jet, or a stove alight in the land.

Science and engineering can recognise no political boundaries, and in the case of an agricultural country, such as Ireland, he could not help feeling that it is of immense advantage to the electrical engineers to be associated with the British Institution, and to possess all the benefits conferred by such association, at any rate till such time as some other language has taken the place of English as the alternative language to the Irish in the Saorstat.

Hydrogen Production and the Grid

IN the course of a lecture on hydrogenation, delivered to the INSTITUTION OF CHEMICAL ENGINEERS in London on October 30th, Dr. E. F. Armstrong explained that whenever pure hydrogen was required in localities where electric power was cheap its production by the electrolysis of 18 to 20 per cent. caustic soda, or of 25 to 30 per cent. caustic potash, solutions was the method chosen. As the potash electrolyte was the more costly and the diaphragms and insulators not so durable, it was usually preferable to use caustic soda. For small quantities, often under 3,000 cu. ft. per hour, electrolytic hydrogen was undoubtedly cheaper than that produced by any other method.

Modern electrolytic plant might be divided broadly into two types: filter press and collecting-bell cells. The chief advantages claimed for the former were low first cost and the small floor space required, but it presented many difficulties in design. The bell type was represented by the well-known Knowles cell of the International Electric Plant Co., and this British concern held the field.

An efficiency of 140 kWh per 1,000 cu. ft., and a guaranteed purity of from 99.6 to 99.8 per cent. oxygen and from 99.8 to 100 per cent. hydrogen could be regularly obtained. A cell to pass a given current at 2 V would require three times the electrode area of one to pass the same current at 2.5 V.

Costs and Efficiencies

The capital cost of electrolytic plant was therefore lowest when the cells were run at minimum output, but then the efficiency was lowest and the cost of electricity at the maximum. Thus, interest and depreciation charges increased practically in direct proportion to the total electrode area, while the cost of electricity decreased. For every case there was a particular electrode area per cell at which the sum of the charges was the minimum and the cost of electricity governed the voltage per cell to produce gases at the lowest overall cost, which would vary in each case according to the price at which electricity could be purchased and the value of the by-product oxygen.

So far as gas purity was concerned, asbestos diaphragms were superior to metal. The "Bamag-Meguin" patented diaphragm consisted of mechanically pure asbestos threads with a thin core of polished stainless steel, which added mechanical solidity to the weave, so that a diaphragm of almost unlimited life was obtained.

A Good Off-peak Load

The lowest cost of off-peak electric power was from 0.2 to 0.1 pence per kWh, but electrolytic plant was not near a town as a rule and, therefore, should the demand for hydrogen grow to large proportions, serious thought might have to be given to linking up its production with power stations.

There had been a tendency to concentrate too much attention on the production of hydrogen from water gas, or coke-oven gas, and to neglect the electrolytic cell in connection with off-peak load. With the grid scheme now being developed in this country there was no reason why the main power stations should not use electrolytic plant to produce considerable quantities of cheap hydrogen as an off-peak load; this could be transmitted considerable distances under high pressure, and would assist the power stations to produce electrical energy even more cheaply.

Power Station Men and Distribution

THERE was an attendance of 120 at the thirteenth annual dinner of the South Coast Section of the ELECTRICAL POWER ENGINEERS' ASSOCIATION at Brighton on October 31st. Mr. J. Randall Goodall, station superintendent at Eastbourne, presided, and Mr. W. N. C. Clinch, engineer and manager at Brighton, in moving the toast of the Association, said that there was to-day a fear that the grid scheme would involve the closing down of power stations and unemployment, but he thought that development on the distribution side would easily absorb displaced men. Mr. A. E. Ricketts, the national president, in responding, said the Association had always impressed upon its members the necessity of keeping abreast of the times. They claimed that they were experts, and they wished to substantiate that by the service they gave.

The chairman submitted the toast of "The Visitors," and in reply the Mayor of Brighton (Ald. S. C. Thompson) said that Brighton had an undertaking on which two millions had been expended, and it had an income of £300,000 per annum. The new 15,000-kW turbine (inaugurated on November 4th) would bring their capacity to 55,000 kW. He forecast that in a year or two's time Brighton would be lighted and warmed by electricity, and cooking and washing would be done electrically.

Apparatus Manufacturing Problems

AT the opening meeting of the 1931-32 session of the London Students' Section of the INSTITUTION OF ELECTRICAL ENGINEERS a paper was presented by Messrs. G. J. Shaw and G. A. M. Hyde, B.A., on "The Business of Electrical Apparatus Manufacture," which showed how close co-operation between the various members of a manufacturing organisation would help to reduce costs and restore trade. The salesman could assist by estimating the probable demand and the cost at which the article would be placed on the market by competitors. Investigations of this nature would prevent the loss of time and money incurred by manufacturing articles which might later prove difficult, or even impossible, to sell.

While it was admitted that foreign competition was severe, it was made apparent that the problem was not without hope.

Foreign Wages

The suggestion that the root of the evil was the employment of sweated labour by the foreigner was dismissed by the authors, who pointed out that the foreigner had always paid less for his labour and yet not so long ago we had a very fair

share of the world's markets. The complex nature of the crisis and the extreme urgency for remedial expedients rendered difficult the finding of a suitable solution; as any suggestion for grappling with the problem must be simple and capable of immediate application without disorganising existing systems, the authors put forward the view that much closer co-operation between business and technical staffs would go a long way towards alleviating the difficulties that threaten to engulf us.

The Limit of Standardisation

The existing system of strict demarcation between the duties of the technician and business expert was deprecated as leading to undesirable specialism, the consequences of which rendered each class unable to appreciate the difficulties of the other. Economies were effected by modern methods, not only by the rapid production of parts, but also by the interchangeability that was made possible by the accuracy with which they could be made. As, however, accuracy cost money, the designer was warned against the setting of unnecessarily fine limits, for a slight difference in the construction of an article considerably altered its cost.

The use of standard parts was urged because a considerable waste of money might be incurred by the making of tools which were not to be in constant use. It was not maintained that standardisation would always result in ultimate economy; in fact, there was considerable doubt about its efficacy when carried to extremes, for, whilst it was nearly always advantageous to standardise the parts of which an assembly was composed, it was not always desirable or economic to standardise the unit as a whole. A design that was incapable of minor modification to meet the individual requirements of customers with varying temperaments and technical standards might prove difficult to sell.

Opinions and Suggestions

THE importance of improving the illumination of coal mines is emphasised in a comprehensive paper read by Dr. T. David Jones before the North Staffordshire branch of the NATIONAL ASSOCIATION OF COLLIERY MANAGERS. The local Press reports him as concluding that better lighting is essential, and that the adoption of new high-candle-power lamps should be proceeded with rather than altering 2-volt lamps. It is necessary for the bulbs to be rated by the manufacturers, a systematic method of changing bulbs should be adopted, and manufacturers' maintenance and battery-charging rules should be adhered to. The use of reflectors needs further consideration, and a large fall in candle-power is detrimental, since miners' eyes are bound to be tired at the end of a shift. The benefit to be derived from a new alkaline-battery lamp more than compensates for the additional weight the miner has to carry, which becomes less noticeable with time. The white-painting of tubs, props, and main roads to assist indirect lighting is thoroughly to be commended.

* * *

"Lighting in the Home" was the subject of a lecture given to the members of the Plymouth branch of the ELECTRICAL ASSOCIATION FOR WOMEN at the opening meeting of the 1931-32 session by Mr. Howarton, a representative of Messrs. Harcourts, Ltd. He suggested that electrical fittings should tone with the furniture of a room. Not long ago it was possible to obtain the best sort of glass for electric lamp shades only in France, but for the past four or five years it had been possible to produce an excellent all-British glass. The careful housewife should choose fittings to harmonise with her scheme of decoration. In the kitchen he recommended as most suitable a totally-enclosed unit with a three-ply glass bowl to exclude any dust there might be. For the bathroom it was now possible to have metal fittings that would neither "steam" nor rust. The most fashionable fitting for the dining-room was a panel-shaped moulded glass pendant, though many people still liked the corona type. Cylinder-shaped lamps were once more in popular favour for the modern hall.

In the paper which he read at the ASSOCIATION OF UNIVERSITY ELECTRICAL ENGINEERS in Dublin on October 30th, Mr. J. O'Doherty did not attempt to show how to keep the consumers' voltage within stipulated limits (such as 4 or 5 per cent. of its nominal value) but rather how to determine the *best* voltage conditions which could be obtained under various circumstances. First, possible rather than practical examples were chosen to illustrate diagrammatic representation of voltage conditions and to introduce the method of regulation in accordance with the average drop. Then some general aspects of control in large systems were examined; the effect of non-synchronous loads was treated, and the equity of regulation to the "average consumer" was discussed. In the last section the determination of best voltage conditions in a 38-kV loop system was examined in detail. The author said that the real difficulty in practice was data; it was obvious, however, that since the only real standard of supply was voltage, continual care should be exercised to obtain statistics so that the best conditions could be determined and maintained.

* * *

In an address on October 29th, in Glasgow, to the Scottish Students' Section of the INSTITUTION OF ELECTRICAL ENGINEERS, Mr. L. B. Torond, the chairman, appealed to students of electrical engineering to study the business as well as the technical side of their profession. He believed that they had the best commodity in the world to sell, but hitherto they had not known how to sell it. Sometimes the engineer despised publicity, but he was wrong. He wondered if students did not think rather too much about being technically proficient and forget to obtain a proper grasp of business methods and finance. Every day it was becoming increasingly evident that the engineer must pay due attention to the commercial side of whatever branch he took up. So far as he could find out, none of the technical colleges taught the art of spending money economically; if the commercial side were added to the training of an engineer, they might see more engineers as directors of industry.

Industry and Politics: The New Phase

THE relations between industry and politics have never been very friendly. On the one hand, industry has felt that the politician treated it merely as a convenient source of revenue and dealt with every application for help or encouragement as a selfish attempt to gain excessive profits. On the other hand, the politician has looked upon industry as a sectional interest with little or no voting power, and therefore not worth serious consideration in comparison with the enfranchised masses. Consequently, the politician has never encouraged the industrialist to enter or to influence the political field, while the industrialist has come more and more to distrust the politician and to look less and less to Parliament and State Departments for assistance.

Of late years this distrust deepened until it reached something like hostility. One became quite accustomed to hearing manufacturers, engineers, and business men in general express the utmost contempt for the morals and the usefulness of politicians. As industries grew better organised and more definite in their collective opinions, so the policy of each and every party seemed to become more indifferent to their power and their views. The formation of such bodies as the National Council of Industry was a symptom of the feeling that political parties, even when they professed to have a strong industrial programme, had failed to realise the supreme importance of fostering production in a country that depended upon the maintenance of its manufactures and its exports.

It is possible to say a good deal in defence of the politician, who is far from being the free agent that the industrialist imagines him to be. Party leaders have to consider all sorts of factors before they can give practical expression even to their strong personal conviction about the legislation to which industry is entitled. But there is no need to argue that case at the present time. The point of real importance is that circumstances have brought into being a Government with only one purpose—the restoration of British industry—and with no restrictions as to the means it may adopt.

The novelty of this situation as it affects the politician is already widely recognised. Bound by no party pledges and elected to get on with a specific job in the most businesslike way, he must feel as strange as if he had been transferred to another planet. We find him wondering how a deliberative assembly like the House of Commons can function without an effective "Opposition"; he forgets that for the nonce it is a Board of Directors, and that an efficient board is one that dispenses with opposition for opposition's sake. He will take some time to get used to the idea of treating every proposal on its merits—forgetting what Gladstone said in 1881, and what he himself told the free and enlightened electors of his division last year.

The politician can be left to acclimatise himself to the new environment of freedom and full personal responsibility. Those of us who are concerned with industry have our work cut out to adjust our attitude to, and to make the fullest use of, a non-party administration. The opportunity is not only unprecedented; it is likely to be unique. We ought, therefore, to scrap all the controversial stock-in-trade of *Industry v. Politics*, and refrain from visiting upon this non-party Government the sins of its party predecessors.

Several important problems affecting the electrical industry are under consideration. We have to safeguard the future of electrical manufacture in relation not only to foreign competition, but also to the development of engineering production in the Dominions. The better organisation of distribution is an essential matter in connection with the prosperity of the national system of power production. Railway electrification, which demands attention on its own behalf, has a vital relation to general supply as well. In handling these questions the electrical industry may either require or desire Government assistance, or it may want to be left alone to work out its own salvation. One way or the other it should be able to get exactly what it demands if it is able to put forward a reasonable case.

If, therefore, the industry does not take advantage of the present opportunity it will have only itself to blame. In a few years' time party warfare will be resumed and industrial questions will once more be the shuttlecock of the hustings.

PROTONIUS.

Correspondence

Correspondents should forward their communications as early as possible. No letter can be published unless we have the writer's name and address in our possession

Lighting the Home

I am not a regular reader of your journal, as I am not in the electrical industry, but I happened to pick up your Special Issue of October 16th in a hotel in Wales, and read with interest your remarks on home lighting.

My experience may interest you. Being thoroughly tired of dangling flex, I decided some time ago to rearrange my lighting installation, and approached three electrical establishments in my district. I was informed that there was no solution to my troubles—that wall lights gave no real light. and that a ceiling light was very costly and not to be advised.

I cannot afford anything very elaborate, but surely there must be some way to obtain a really good effect as you suggest.

Not one of the dealers even suggested coming to see what I wanted. I was informed that if I came to them with some plan they would inform me if it was practicable. Surely this is not for me to do! Yet perhaps there *does* exist an enterprising firm prepared to help, and perhaps you may be able to give me some advice on the matter.

If by any chance you should print this letter, please omit my address, otherwise no doubt I shall find myself inundated with offers of help!

C. R. JACKMAN.

October 27th, 1931.

Power-plug Points

I was interested in a letter which appeared in your issue of October 23rd on the question of the inadvisability of always fixing plug points on the skirting boards. Many years ago in one of the first installations carried out by me, in a large residence containing about 105 points, I fixed all the plugs about 2 ft. 6 in. from the floor, but since then I have fallen into the general practice of fixing them on the skirting board.

It seems to me that in some cases, such as bedrooms, it might be advantageous to have the plugs 2 ft. or 3 ft. up the wall, so that in the case of sickness it would be easy to get at the switches in case of need. On the other hand, I would like to point out to your correspondent that for decorative purposes the fewer fittings you have sticking out from the wall the better.

Another important point is that in case of radiators and other appliances, such as vacuum cleaners, if the plug were 2 or 3 ft. up the wall the flexibles would lie at an angle so that anybody passing would come ino contact with them and would be much more likely to pull the plug out than if the flexibles were lying on the floor. Taking it all round, I still think the skirting board is the best place for plugs.

There is just one more point, and that is this: the skirting board is a very convenient place, especially when the cutting away of plaster is involved. In the case of a new house, or when rooms are being redecorated, then it might be convenient to have lighting plugs in bedrooms only about 2 ft. 6 in. up the wall by the side of the beds.

CHARLES RETTIE.

Liverpool, *October 27th*, 1931.

Still the Boiling Plate

The letter from Mr. Best in your issue of October 30th will no doubt echo the sentiments of many other engineers on the matter of improvements in household electrical heating devices. The suggestions put forward on cookers are really constructive, and might be read with great profit by the makers of such apparatus.

The keynote in these things is economy in use, which the engineer terms efficiency, and finer control is required, not only for cooking purposes, but also for economy reasons. In boiling and stewing certain things there is no point in very vigorous ebullition, as this only evaporates the water unduly and upsets the process by necessitating replenishment, preventing the job being left for long. What is needed, if electrical cooking is really to come into its own, is the ability to bring liquids quickly to the boil, and then to maintain a suitable temperature with any size of pan. This, as was rightly pointed out, needs better heater design and control, and is not likely to be attained by the present primitive methods. In the course of some research work I evolved various improvements to the heater portion and also a method of utilising a transformer and tappings. Whilst I appreciate some of the advantages of the toroid formation, I do not like some of the disadvantages, and think better electrical control preferable to withdrawing the source of heat, as this means complication and inefficiency.

COOKERS, TOO!

Other things than cookers have, however, been long at a standstill with regard to efficiency. The majority of makers of some types of electric fires are evidently pleased to let things stay where they are and content themselves, for instance, with combining antique metalwork arrangements with the coiled-wire heater of almost the same period, or imitating of the coal fire. When ideas representing sound advances in a certain line have been placed before some manufacturers they have only brought the reply, when one was forthcoming, that they were not interested.

In other words, it seems to be assumed that because the energy is converted into heat at or about a certain point, that this is all that is required, and that nothing further can be accomplished. We have long been at a standstill in these matters, and it would be refreshing to see a little more enterprise.

CHARLES E. BAXTER.

Huddersfield, *October 30th*, 1931.

Canvass the Country

May I venture to take advantage of your invitation to avail myself of the opportunity to express my views on a subject of electrical interest, and of fact, and point out that allocating blame publicly for slow progress is a worn-out stunt employed by the Socialist party dominating the electricity committees of the municipal authorities in certain quarters.

In their determination to obtain control and introduce direct labour at the expense of the individual they resort to methods not usually accepted in ordinary business circles. Imagine a large corporation deliberately confining the activities exclusively to seven contractors where hundreds are available in order to concoct a charge of lethargy against the whole industry! Fortunately, the attempt to obtain permission to employ direct labour failed. Private enterprise is baulked usually by the lack of mains extension, and when that fails unemployment grants awaiting sanction are offered as an excuse.

If one firm can provide one thousand new customers in one year off its own bat, in spite of these difficulties, there must be others capable of doing the same. At the present moment hundreds of potential consumers are awaiting facilities, and surely this should protect the contracting industry from any stigma.

There is no reason why the same successful system should not be adopted nationally with efficiency and economy, to the satisfaction of all parties. An understanding on these lines would end the extravagant and poaching methods masquerading as business propositions.

L. E. WILSON.

Manchester, *November 2nd*, 1931.

Electric Clocks

We have read with much interest Mr. Philpott's article under the above title in your issue of October 23rd, and more particularly his references to the use of synchronous clocks on systems in which the frequency is controlled.

As showing how exact is the time-keeping of such synchronous clocks, Mr. Philpott found " a consistent weekly error of four seconds (gain) only." He does not mention the type of clock under observation, but if it is one of the Warren (Synclock) pattern, it should be emphasised that even so small a departure from correct time can only have been due to a departure of the frequency from its correct mean value. The motor armature is absolutely locked to the frequency, and the gain or loss of even a single cycle is a physical impossibility. Whether this can equally be said of the so-called " slow-speed " motors with their closely adjacent, and therefore much less well-defined, poles is not so certain.

Mr. Philpott assumes that the slow-speed motor is likely " to wear less rapidly." Actual experience, however, negatives this assumption. Innumerable Warren motors, after being in use for periods ranging up to 10 years, have been examined under the microscope, and in every case it is found that the gears and spindles at the *slow-running end* of the train alone exhibit signs of wear, the rotor or high-speed end being hardly touched. Although this result may seem unexpected, a little thought will show that it is fully in accordance with modern theory.

HIGH- OR LOW-SPEED MOTORS?

At the high-speed end, the parts are so light and the working forces so minute that the pressure between the spindle and its bearing surface is insufficient to break the continuity of the oil film and the lubrication is perfect. At the lower-speed end of the train (or of course throughout the whole train in the case of a " slow-speed " motor) the weight of the parts and the force transmitted by them are so much greater that effective lubrication is more difficult. The experienced clock maker knows that for similar reasons the wear in a spring-driven clock does not take place at the escapement end, in spite of the high velocity, and that it is the low speed spindles which, unless very effectively lubricated, are so liable to bind. From the mechanical point of view, therefore, the slow-speed construction is distinctly inferior and has, moreover, the many well-known electrical disadvantages inseparable from a slow-speed as compared with a high-speed motor.

In referring to the fact that if the supply fails and then comes on again a " self-starting " clock will be by that much slow, Mr. Philpott omits to mention that such clocks have

the advantage that a clearly visible red signal is provided which indicates when the supply has been cut off; no mistake is therefore possible. The interruption may have been only momentary (owing, say, to the inadvertent removal of the fuse when searching for a fault on another circuit, or the momentary opening of a switch by accident) and a clock that stops and fails to retart causes annoyance, besides which, it may not be by any means evident that an interruption has occurred, and mistakes are very liable to be made. It is for these reasons that it seems to be universally agreed that the self-starting clock is a very great advance upon one which has to be started up by hand.

EVERETT, EDGCUMBE & CO., LTD.

London, N.W.9, *October 26th*, 1931.

With regard to the article "Electric Clocks," in your issue of October 23rd, surely by this time impulse clocks are out of date; anything with a battery attached to it might be most conveniently avoided. One can well imagine a long string of such clocks, connected in series through a rambling building and driven by batteries, giving considerable trouble.

Synchronous clocks appear to be the modern solution of obtaining reliable time, but most of those I have seen have been very noisy, and in a quiet room this noise is apt to be extremely irritating. I understand that some of these clocks have a small rotor which makes 3,000 r.p.m.; as this rotor is working continuously, will not excessive wear of the bearings be experienced, or are adequate means of lubrication provided automatically?

It would seem to me that in purchasing one of these clocks one must first of all get in the local electrician to fix a plug over the mantlepiece; otherwise a flexible cord must be run all the way from the clock to the nearest available supply. Notwithstanding this, however, I consider that the synchronous clock will become extremely popular, because it does give exact time without attention, providing the frequency at the supply station is kept constant.

One would like to be reassured, however, about the wear.

K. H.

October 31st, 1931.

The £ and Export Trade

The new monetary situation, or the fall in the price of the £, seems to have evoked an optimistic tone in industrial centres, and this is only natural. When our money expressed in terms of foreign monies becomes cheaper, our wages expressed in terms of foreign wages are lower. Our manufacturing costs are relatively reduced and the export of British manufactures is stimulated.

But this is only one aspect of the new monetary situation. A few weeks ago we were warned that the cost of imported food and raw materials would rise as a result of going off the gold standard. It is by no means certain, therefore, that the national loss incurred through an advance in the cost of imports will be balanced by the national gain through a fall in the cost of exports. The question is then whether the new monetary situation can be turned to the national advantage. How can we ensure that the profit on the additional exports exceeds the loss on our essential imports?

The new monetary situation has already stimulated the export of coal, but, even if other countries do not reduce wages, or follow our lead in forsaking the gold standard, the world price of coal is so low that its export has yielded no profit to British collieries in recent years, and is likely to yield little profit in the future. The advantage to the nation of a greater export of coal will most certainly not outweigh the disadvantage to the nation of higher prices for imported food.

HIGHLY FINISHED GOODS MOST PROFITABLE

It is immediately apparent that the optimism in industrial centres is hardly justified from the national point of view. If increased exports are to redound to the national advantage they must be the products of industries which yield normally higher profits than the coal-mining industry, and, fortunately, such industries exist. As our Census of Production shows, the net increment per worker, an increment which determines both the rate of wages which can be paid and the profits which can be earned, varies very greatly from one industry to another. The Census also discloses the interesting fact that this increment is higher, on the whole, the further the actual product of an industry is removed from its raw material—the more highly finished the product is.

For example, wages and profits are higher in that branch of the textile industry which furnishes artistic piece-goods, hosiery, lace, gloves, etc., than in those branches which provide common piece goods, cotton waste or yarn. Similarly, higher wages are paid and a bigger rate of profit is earned in the motor car and electrical industries than in the steel industry, while the same difference is noticeable in the fine chemical and coarse chemical industries.

The new monetary situation will benefit Great Britain, therefore, provided the additional exports are derived from industries producing highly finished goods, for not only do such industries yield the highest wages and profits, but they are particularly susceptible to the benefits of a larger output, to the benefits of mass-production. That is to say, an enhanced output in these industries results in a huge decrease in production costs, so that higher wages can be paid and more profits distributed without any advance in prices.

FINDING MARKETS

The next question is: Where can Great Britain find a larger export market for highly finished goods? The markets of other industrialised countries, as the U.S.A., Germany, France, Italy, etc., are closed against us by high or prohibitive tariffs. There remain, however, neutral markets, and the markets of the British Empire. The self-governing Dominions, in particular, could offer us a larger market for highly finished manufactures. At present they purchase the bulk of their requirements from our industrial competitors, yet in return for the British market for their natural produce they would be prepared to give us an effective preference in their market for British manufactured goods.

It is through such a policy alone that our new monetary situation can really be turned to Great Britain's advantage. Indeed, although the situation may be a new one for us, it is an old one for many Continental countries. Wages and manufacturing costs in Germany, for instance, have in general been relatively lower than in Great Britain, and the Germans, from the time that they became industrialised, utilised this situation exactly in the manner described. They freely imported partly finished goods, and concentrated their attention on the export of highly finished manufactures. They bought from us cotton yarn and sold us cotton gloves. They imported coal and exported dyes. And having disclosed the secret of Germany's successful industrial policy, let us emulate their example, when the optimism in industrial centres will be justified by events.

J. S. HECHT.*

Bexhill-on-Sea, *October 31st*, 1931.

The Electric Drive in Factories

Naturally, perhaps, bias is to be expected, but really the author of the article bearing the above title should make himself acquainted with actual facts and figures before presenting such a misleading and incorrect comparison between oil-engine and electric motor drives.

Mr. Conly will find that fuel oil is nearer £3 5s. than £4 5s. per ton, particularly in areas where his electricity is but 1½d. per kWh. He will find that the cost of the 70 b.h.p. heavy-oil engine with the foundations and equipment which he mentions will be nearer £500 to £600 than "not less than £1,250," and his oil engine consumption figures are from 20 per cent. to 30 per cent. wide of the mark. We will not waste your space with further criticism of such valueless and shallow comparison.

We are proud to say that the oil engine industry in this country has a widening circle of friends amongst sound-thinking electrical engineers, who recognise that the modern heavy-oil engine has, like electrical energy, a very useful and economic sphere in works and factories of various trades.

Misrepresentation, as indulged in by the author, is, in these days of accumulated experience, almost ludicrous.

RUSTON & HORNSBY, LTD.
E. V. Newton, Manager.

London, W.C.2, *October 27th*, 1931.

Testimonials from Employers

I fully endorse the remarks of "Grad.I.E.E.," in your issue of the 30th inst., that it is very unfair for employers not to give testimonials to their late employés, as it is the cause of many applications being turned down.

In the end it only takes a few minutes to write a testimonial, and once done is finished with, and must be far less trouble than answering inquiries from would-be employers.

As we young technical men have no association to press the point, matters will remain as they are.

SIMILARLY AFFECTED.

October 30th, 1931.

R.N.D. Signal Company

The Signal Company of the Royal Naval Division was formed mainly of men employed in electrical engineering and allied industries. A reunion has been held yearly, but there are many whose present whereabouts is unknown and to whom notices cannot be sent. All those who desire to attend the thirteenth annual dinner to be held on Saturday, November 21st, at the Coventry Restaurant, 7, Rupert Street, Piccadilly, London, W., should communicate with Mr. T. U. Riley, St. Vincent, The Avenue, Radlett, Herts.

Fatality

Harold Kemp, electrical engineer, aged 51, was found dead near a switch at the Kilnhurst Steel Works of Messrs. Baker and Bessemer, Ltd., and at the inquest held recently it was stated that he was seen to fall backward from a switchbox. He had a burn on his left hand. A furnaceman said the switch terminals were "alive," and the nearest point at which the current could be turned off was 300 yards away. He did not know that such a distance was against the factory regulations. Medical evidence was that death was due to asphyxia caused by electric shock. A verdict that death was due to electric shock was returned.

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* Author of "Unsolved Problems: National and International," and "Unemployment: Its Three Causes and Three Remedies."

The Central Board's Work

In spite of industrial depression the progress of the National Power Scheme has proceeded according to plan

THE world economic crisis has adversely affected electrical development in most countries, and a slowing down of consumption has taken place. During the first seven months of 1931 total generation has decreased by 8.1 per cent. in Canada, by 9.2 per cent. in France, by 11.7 per cent. in Germany, by 4.2 per cent. in Italy, and by 5.2 per cent. in the U.S.A.

Great Britain alone can record a definite increase (of 3.4 per cent.). The fact that we are somewhat under-developed electrically and have considerable lee-way to make good, no matter how severe the industrial depression, has protected the country from a definite recession in power production.

Generation totalled 10,294 million kWh in 1929 against 10,869 million in 1930, an increase of 5.6 per cent.; during the first seven months of 1931 it reached 6,415 million kWh.

In some ways the diminution of the demand for electricity has facilitated the work of the Central Electricity Board, since it has not been called upon to accelerate unduly its construction programmes in any one part of the country, and has been able to maintain a fairly exact balance between the areas

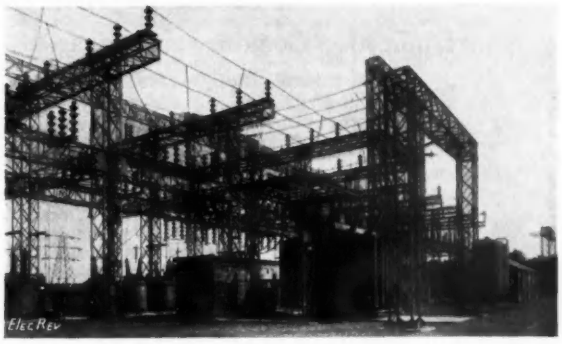
Scheme Area.	Approx. Total Mileages of Route.	Miles of Wayleaves obtained.		Total Towers erected (Miles) at Sept. 30th, 1931.	Lines in Operation at Aug. 31st, 1931.	
		At Dec. 31st, 1930.	At Sept. 30th, 1931.		Route Miles.	Circuit Miles.
(i) *Primary Lines.*						
Central Scotland	240.6	240.6	240.6	240.6	240.6	296.5
North-East England ..	91.3	70.0	91.3	82.9	—	—
North-West England ..	313.0	231.2	299.7	140.8	—	—
Mid-East England ..	322.7	198.8	319.3	251.3	—	—
Central England	395.5	320.4	392.6	286.1	76.1	83.9
East England	138.1	14.3	137.1	40.4	—	—
South-East England ..	520.5	301.9	442.3	307.7	149.1	159.3
South-West England ..	647.0	14.0	299.8	13.7	—	—
TOTALS	2,668.7	1,391.2	2,222.7	1,363.5	465.8	539.7
(ii) *Secondary Lines.*						
Central Scotland	19.7	—	18.1	0.4	—	—
North-East England ..	89.6	30.2	84.8	36.7	—	—
North-West England ..	263.8	129.0	177.8	100.6	72.9	135.6
Mid-East England ..	201.1	97.6	191.5	117.9	39.9	39.9
Central England	18.0	17.8	17.9	17.9	15.7	31.3
East England	24.0	—	7.5	—	—	—
South-East England ..	209.9	71.9	146.4	80.2	67.4	109.8
South-West England ..	110.0	8.5	15.2	13.2	8.6	17.2
TOTALS	925.1	355.0	659.2	366.9	204.5	333.8
GRAND TOTALS	3,593.8	1,746.2	2,881.9	1,730.4	670.3	873.5

Progress of the Grid to August 31st last

comprising the whole of the national power system. The preservation of such harmonious development has been a fairly important factor in keeping down excessive capital costs, and in allowing the Board to adhere closely to the reasonable estimates made by the Weir Committee in 1925.

By the end of 1930 nine schemes covering 76.7 per cent. of the area of Great Britain, 98.2 per cent. of the population, and 99.5 per cent. of the output of authorised undertakers had been delimited by the Electricity Commissioners, and eight schemes had already been adopted by the Board, whilst the ninth (for South Scotland) was finally adopted, after much negotiation, on July 31st, 1931. The last remaining area (for North Scotland) is still being surveyed by the Commissioners, and the scheme has not yet been received by the Board.

To all intents and purposes, therefore, the whole of the country had been mapped out, and it was possible by the middle of the year to see the country as a single unit, with a programme of development covering the next ten years. The position is shown clearly in one of the accompanying tables. This indicates the most important areas to be South-East England, North-West England, Central England, and Mid-East England, all of them comprising the greater bulk of



The Hams Hall (Birmingham) Sub-station

the principal industries of this country. At that date also 119 stations had been selected and provision had been made for sixteen new stations. In Central Scotland the main transmission system had been completed by the end of 1930, the general tariff has been in partial operation during 1931, and at the time of writing the grid was transmitting over its system in that area at the rate of 600,000,000 kWh per annum.

At the end of September, 1931, wayleaves covering 832 miles of primary lines operating at 132,000 V and 304 miles of secondary lines operating at lower voltages, a total of 1,136 miles, had been obtained. In South-East England, which presented special difficulties owing to the enormous congestion of population round London and the great number of housing estates which have come into existence, more than 80 per cent. of all wayleaves required had been obtained. At the same date 1,730 miles of transmission lines had been erected with a corresponding number of sub-stations, an increase of 913 miles since December 31st. Primary lines accounted for 1,363 miles, and secondary lines for 367. The other table shows that a number of areas are approaching completion.

Expenditure and Tariffs

On October 29th the Central Board placed a contract worth £337,000 for 230 miles of main transmission lines in South Scotland with British Insulated Cables, Ltd. This virtually completes the contracts required by the Board for the construction of the national grid, which is, of course, merely the machinery with which the Board will carry out its main work of supplying electricity "wholesale and universally." Since its inception the Board has placed contracts worth £21,209,000, and all of them have gone to British firms. Since the beginning of this year the Board's contracts have totalled £2,900,000.

It is estimated that at the end of December, 1931, a total of 2,100 miles will have been erected, an increase of 1,200 miles during the year, while 3,246 miles of wayleaves will have been negotiated, representing an increase of 1,500 miles; and by the beginning of 1933 the construction period will come to an end.

In the west of Scotland at the end of September, 1931, more than half of the expenditure required for the standardisation of frequency had been sanctioned by the Board; in North-East England about 40 per cent., in Central England about 33 per cent., and in other areas between 30 and 40 per cent., the total expenditure sanctioned amounting to slightly more than £7,000,000, one half of this figure being represented by North-East England alone. It has been estimated that this work will be completed in about two years' time. The total expenditure incurred by the Board, inclusive of the standardisation of frequency, is about £28,000,000.

In Central Scotland a grid tariff has been introduced, but negotiations with authorised distributors are not yet completed. In all other areas agreements, largely of a provisional nature, have been made with isolated undertakers without any tariff being yet introduced for an entire area. It may be possible to arrange such a tariff for South-East England during 1932. On the whole, the progress made by the Central Board in 1931 has been definitely ahead of programme, and it has been attended by few technical difficulties.

Contracts entered into for	Central Scotland.	South-East England.	Central England.	North-West England and North Wales.	Mid-East England.	North-East England.	South-West England and South Wales.	East England.	TOTALS.
	£	£	£	£	£	£	£	£	£
Principal main transmission lines	664,996	1,990,601	990,216	1,018,417	801,383	601,635	1,165,323	303,883	7,536,454
Lower voltage transmission lines	6,105	2,231,698	52,274	414,333	394,017	177,490	61,092	—	3,337,009
Principal transforming stations	994,203	1,837,079	1,224,573	1,367,579	874,396	425,350	838,097	139,858	7,701,135
Lower voltage transforming stations ..	—	1,082,951	17,206	196,887	222,968	14,011	26,253	6,007	1,568,283
Other works	89,106	226,245	123,868	65,250	61,518	27,210	827	15,300	609,324
TOTALS	£1,754,410	£7,368,574	£2,408,137	£3,064,466	£2,354,282	£1,245,696	£2,091,592	£465,048	£20,752,205

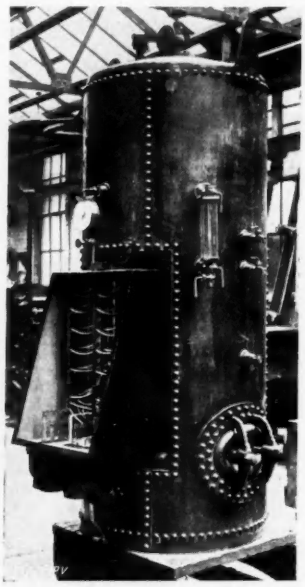
Some details of contracts placed by the Central Electricity Board

New Apparatus and Devices

for Domestic, Cooking and Heating, Lighting, Power and Scientific Purposes

Steam-raising Equipments

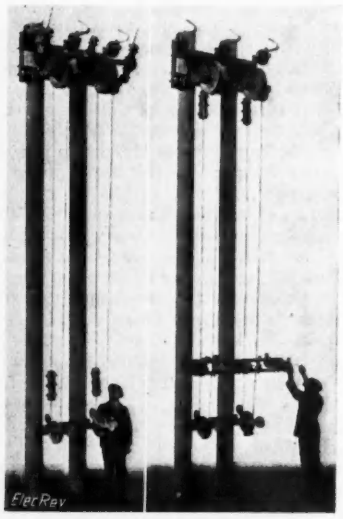
The accompanying illustration depicts one of two steam-raising equipments recently manufactured by A. Reyrolle & Co., Ltd., Hebburn-on-Tyne, to the order of Manlove, Alliott & Co., Ltd., for use in a steam laundry. Each equipment is designed to supply 360 lb. of steam per hour at a working pressure of 60 lb. per sq. in., and is suitable for direct connection to a 3-phase, 400-V, 50-cycle supply. The shells are of the Cochran type, with a number of horizontal tubes into which are fitted 48 tubular immersion heaters with a total loading of 150 kW. Three sections, each with 16 heaters, are connected to three separate sets of bus-bars. Each section is controlled by a separate hand-operated switch. The shells were hydraulically tested to 120 lb. per sq. in. and then filled with water to half gauge-glass, the temperature of the water being 82 deg. F. The full load of 150 kW was applied, and a steam pressure of 60 lb. per sq. in. was raised in 50 minutes. During a steaming test for one hour approximately 40 gallons of water was evaporated, representing an output of 400 lb. per hour. The tests were made with the shells unlagged, and an increased output is therefore to be expected on site. The injectors were tested with feed-water at 115 deg. F. and found to work satisfactorily. The low-water alarm discs were also tested, and it was found that at 60 lb. per sq. in. steam began to escape after three minutes and the whistle sounded two minutes later. The low-level alarm is fitted with the inlet at the point corresponding to the water-level below which there would be a risk of burning out the heaters, and when this is reached steam is admitted and melts a disc of low-melting-point metal. This allows steam to escape and operate the whistle fitted on the top of the alarm. The makers have also prepared designs for installations of 15-, 30-, 40- and 80-kW capacity, and are ready to develop schemes of any capacity to individual requirements.



Reyrolle 150-kW Steam Generator for Laundry

Overhead-line Switch-fuse

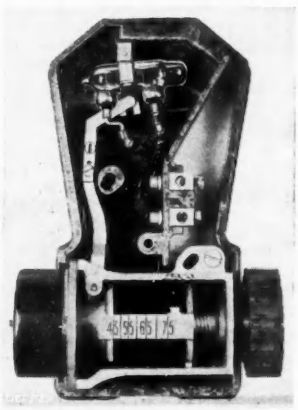
George Ellison, Ltd., Perry Barr, Birmingham, have introduced a new overhead-line switch-fuse, at present for 11,000 V, the special feature of which is the operating gear. This enables the switch-fuse to be used as a horn-break disconnector and has the great advantage that the linesman can bring the fuse carriers down to his level while remaining standing on the ground. The switch can be opened or closed from the ground without the use of any other appliance or tool, and the fuses can be lowered by turning a handle to bring them to a convenient position for renewal by a man standing on the ground. A novel arrangement of steel rope and pulley mechanism winds the set of fuses up or down. The fuse-carrying structure, being counterbalanced, is raised with little effort and rides easily over the top pulleys to engage with the fixed contacts in perfect alignment. The fixed insulators are so disposed in relation to the upper pulley centres that, by turning the handle the fuse holders are withdrawn to a more or less horizontal position exactly as a switch. The fuse holders may be padlocked withdrawn as a switch in its "off" position, or in the "on" position, or at any point of their travel from the contacts to the completely lowered position. Circuit is broken at the higher contact jaws first, as a knife switch opens, so that any magnetising current that may be flowing is broken on the contacts with horn breaks.



Ellison pole-mounting switch-fuse in "up" and "down" positions

Vapour-tension Thermostat

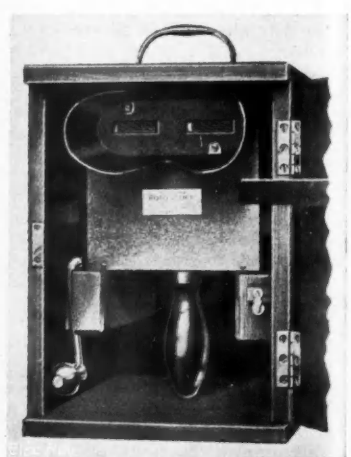
The new "Unity" thermostat introduced by Barker, Young & Co., Ltd., 47, Victoria Street, S.W.1, is designed primarily for controlling tubular-heating installations, and is of the vapour-tension type, in which the vapour tension of the liquid employed is independent of the volume of the container and, provided a suitably proportioned spring is employed to oppose its expansion, relatively large movements may be obtained, thus reducing the leverage required. The mechanism is housed in a "Bakelite" case of pleasing shape. The projection on the left contains copper bellows of the type employed in an aneroid barometer, the expansion of which, due to the vapour tension of the contained liquid, is directly opposed by the spring in the centre of the case. The compression of this spring is controlled by rotating the knob on the right of the case. The scale is carried on a bracket fixed to the compression plate on the right side of the spring, and is visible through the small window in the cover. The mercury tube (20 A a.c. or d.c.) is mounted in the top of the case and is rocked by the pivoted lever passing down the left side of the case. As the expansion of the bellows is directly opposed by the spring, only secondary forces are carried by the bearing of the rocking lever, and wear of this pivot will not materially affect the adjustment of the instrument, while a considerably improved sensitivity is obtained, the differential of the instrument being plus or minus 1 deg. Two slotted holes are provided for mounting the instrument directly on to a standard circular conduit box embedded in the plaster, and the lower right-hand fixing screw passes through the die casting housing the thermal mechanism, thereby earthing the instrument. At the top and bottom of the case are removable "Bakelite" slides covering holes for the reception of conduit run on the surface of the walls. The two main terminals are in the centre of the case. For locking the adjustment of the instrument a number of holes are drilled in the adjusting knob, and a screw may be inserted through the appropriate hole into a tapped hole in the lid. When the adjustment is locked in this manner it is impossible to remove the lid.



"Unity" Vapour-tension Thermostat

Speed-measuring Instrument

The new C type Ashdown "Rotoscope" introduced by A. J. Ashdown, Ltd., 119, Victoria Street, S.W.1, is an innovation in speed-measuring equipment, for although it works on stroboscopic principles, the speed is actually given as a direct reading on an engraved scale. It is driven by a clockwork motor governed by a master key control to one definite standard of speed. This standard is set so that it can be checked by sound in a simple way, and its regulation cannot be interfered with by any but an authorised person who keeps the key by which the instrument is regulated. This he does by noting the time period of the clicks produced in the machine when it is being so tested, and adjusting with the little key provided. The operator has only to wind the instrument and, while sighting, to turn the controller wheel until the desired view of the object is obtained. At this point its speed can be read straight off from the instrument scales. Thus the moving shaft or object is timed accurately without making contact with it. There are no charts, and the need for stop-watches, attached speed-



C Type Ashdown "Rotoscope" in case

counters, tachometers, etc., is completely eliminated. The second important service of the instrument is secured by setting the control slightly below the speed of the object which is to be observed under "slow-motion" conditions, so that the observer is actually enabled to see what the object looks like. The instrument is self-contained and self-driving, and is equipped with an infinitely variable speed graduation within the range—800 to 6,000 p.m. Speed setting is secured on two scales: one, the rack scale reading in hundreds of r.p.m.; the other, the unit scale on the controller wheel. The bladed shutter, or sight gear, is of special material and formed to ensure dynamical balance and smooth running at all speeds. The instrument is constructed with a heavy brass framing, and the exterior is in aluminium, black crystallised lacquer finished.

Special Plug and Socket

As a practical solution of plug-and-socket problems in general, George H. Scholes & Co., Ltd., Blantyre Street, Hulme, Manchester, have introduced the "Wylexion" unit with somewhat drastic departures from the usual construction, but designed in accordance with B.E.S.A. standards. A non-arcing feature is the result of the plug pins engaging with dead metal at the socket entrances, this dead metal forming part of an outer cylinder arranged concentrically with, but insulated from, the actual contact socket. The socket tubes are forced out of alignment when the plug is disengaged, and the correction of the alignment by the plug pins results in a quick make. The diameter of the socket cover is such as to prevent one pin only being inserted, and the socket entrances are closed when the plug is out by the makers' rotary-type spring-controlled shutter. The alignment springs offer equal pressure to each pin, so that interchangeability and good contact are assured. The pressure contacts permit great tolerance in the diameter of the pins without impairing the capacity of the plug. A report on tests carried out at the National Physical Laboratory shows very satisfactory results.

Construction of "Wylexion" Plug and Socket

Soil-heating System

MR. NORMAN SCOTT, 8, Chapel Road, Moorside, Swinton, Manchester, has sent us particulars of the improved "Adamsaid" intensive system of cultivation employing electric soil heating. The usual procedure of placing protective frames over the soil is reversed, and the soil is put into special frames raised in tiers to a convenient working height. The original cloches have been greatly improved by the introduction of heat-retaining sides, and the resulting frame-cloches may be used in long runs with heating cables contained in the soil.

A Lamp Flasher

A recent introduction into this country by M. Newark and Co., 77, Milton Street, E.C.2, is the "Gacor" flasher, a neat little device which is designed automatically to flash an ordinary electric lamp, two seconds on and one second off. It should prove suitable for advertising signs or displays, shop windows, seaside illuminations, etc. It is only one inch long, and fits into any ordinary lampholder, receiving the lamp in the same way. It is suitable for up to a 60-W lamp, and for any voltage from 100 to 220.

Automatic Butt Welder

The No. 92 automatic butt welder recently introduced by British Insulated Cables, Ltd., Prescot, Lancs., is a fully automatic flash welding machine of the type supplied to shipbuilding companies for welding tubes up to 10 in. diameter and flanges on to tubes. The slide is brought forward at a predetermined rate by an electric motor for the time necessary to raise the two ends to be welded to incandescent point, when the upsetting pressure is automatically applied. This method ensures that when one weld has been made and tested, every subsequent weld will be of identical strength independently of the skill of the operator. The Board of Trade has insisted that for shipbuilding work an automatic machine must be employed.

A Vibration Meter

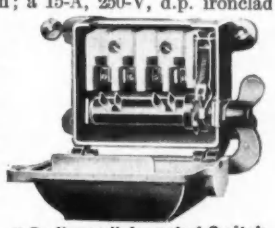
The Askania "Vibrograph" recently introduced in this country by Mr. O. G. Karlowa, Abford House, Victoria, S.W.1, was developed in close co-operation with several famous scientists, including Professor Hort of the Heinrich Hertz Institute. The principal features are: Great recording accuracy, and at the same time a magnification of the indicator within the widest range; the combination of three components as one compact unit; it is always ready for use and easily handled; and filling of damping vessels and the use of loose parts are avoided. The magnification of each component is adjustable from 100 to 3,000 by means of a knob, and the damping is also adjustable in the same manner. Records are taken optico-photographically and are very accurate. The instrument is designed in such a manner that it can be used with one horizontal and one vertical component, and can also be supplied with only one horizontal or one vertical component.

Novel Pilot Light

We learn that the "Nivex" pilot lamp marketed by the Runbaken Magneto Co., Ltd., 280, Deansgate, Manchester, is now supplied in a by-pass model, the by-pass at the side of the main chamber carrying the auto-transformer being fitted with the small lamp, while an ordinary lamp is inserted at the lower end of the chamber. For the main lamp there is a chain-operated switch.

Small Switch- and Fuse-gear

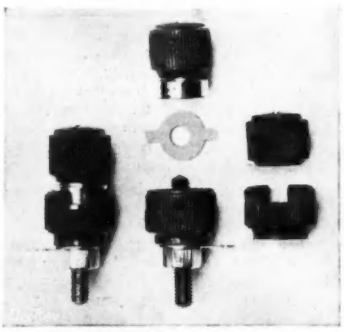
J. A. Crabtree & Co., Ltd., Lincoln Works, Walsall, have recently placed upon the market a new and very comprehensive range of "Pedigree" switch- and fuse-gear specially designed for circuits up to 15 A capacity at 250 V. It is especially of interest, therefore, for small house service and industrial work. The range consists of a 10-A, 250-V d.c. ironclad combined switch-fuse (this unit is offered as an alternative to the makers' shockproof type and is recommended where installation costs have of necessity to be reduced); a 15-A, 250-V, d.p. ironclad switch; a 15-A, 250-V, d.p. ironclad combined switch fuse; 15-A, d.p., ironclad combined switch-fuse "splitters" with either two- or three-way d.p. fuses; iron-cased 10-A and 15-A d.p., 250-V fuse boards, two to ten ways; and teak-cased 10-A and 15-A d.p., 250-V fuse boards, two to ten ways. The units are of very neat design and appearance, and embody sound spring-operating mechanism to give a smooth and positive action. The stop which limits the movement of the switch arms is situated on the internal mechanism and not on the cast-iron case. The switch blades are specially designed and moulded into a "Jacelite" rocker bar to eliminate separate clips and screws. The fuses proper are of the makers' new H.O. type. In the iron-cased fuse boards a decided departure from usual practice is an all-steel body housing the interior. Pressed-steel hinge lugs and fixing feet are a further refinement, and the addition of spot-welding of the lugs and feet makes a strong and light job. It is claimed that breakage in erection has been entirely eliminated. An ingenious lid-locking device is provided in place of padlock and key devices. A very pleasing finish is obtained in the standard bright black stoving enamel. The teak-cased fuse boards are made in the company's own wood-working shops from specially selected material; solid panel fronts are standard, and the whole of the board is finished with a high polish.



"Pedigree" Ironclad Switch-fuse; 10 A, 250 V

Special Terminals

The accompanying illustration depicts the construction of a new type of terminal, several examples of which were awarded a first prize at the recent International Inventions Exhibition in London, being shown by Mr. J. De Wet, Brooklyn, Earl's Court Square, S.W.5. The terminals are made in "Bakelite" and metal finished in nickel plate and stainless brass. The design is simple and suitable for mass production, and the terminal can be clamped more than finger tight in any position. The clamping surfaces are protected from dust, and the wire can be inserted either right or left hand and examined in position before clamping. A tag washer eliminates any possible injury to the wire while clamping, and several wires may be clamped in definite positions with respect to each other. The terminal can be produced in several sizes and colours. Non-oxidising material is used at the contact surface, and all clamping strain is confined to the metal part of the terminal to avoid deformation of the insulating material.



Construction of De Wet terminal

Bulkhead Fitting with Prismatic Glass

Prismatic lenses have been embodied in two types of bulkhead fittings introduced by the Revo Electric Co., Ltd., Britannia Works, Tividale, Tipton, Staffs, and on tests they have been found to give twenty times the useful illumination previously obtained by the ordinary type of bulkhead glass. The fittings have cast-iron bodies, white enamelled inside, and each is suitable for a 60-watt lamp.

Business and Industrial Notes

The Week's Electrical Trade News from all Sources. Commercial and Industrial Developments, Business Changes, Market Prices for Materials, Trade Openings, New Publicity Literature, Liquidations, and Failures

Central Electricity Board Contracts

The Central Electricity Board has placed a contract with BRITISH INSULATED CABLES, LTD., for 230 miles of main transmission lines for the South Scotland Scheme. The value of the contract is £337,000. It is reported that this virtually completes the contracts required by the Board for the construction of the national grid scheme. W. T. HENLEY'S TELEGRAPH WORKS CO., LTD., have also received a contract from the Central Board, through Messrs. Merz & McLellan, for the supply and erection of 43 miles run of three and six 0.1-sq. in. steel-cored aluminium conductors on lattice steel towers for a working pressure of 33,000 V. This is an extension of the contract for the South-East England Scheme which was placed with Henley's last year and on which work is proceeding.

The British Industries Fair

A new information system has been adopted by the British Industries Fair in Birmingham. The new system has involved the compilation, now nearing completion, of an alphabetical card index consisting of the names of some 10,000 articles manufactured by firms which will exhibit in the Fair at Castle Bromwich next February. This index, which will be kept for reference in the Fair offices, supplements the catalogue, and will displace the advance catalogue published for the last two years, and which the London Section of the Fair is preparing as usual. It will be continually added to. Over 120,000 folder-letters have been sent to the world's buyers, telling them about the Fair and inviting them to fill in postcards reserving accommodation and asking for particulars from the index. At Birmingham over 85 per cent. of the space available has been let.

Latvian Electrical Trade

The *Board of Trade Journal* reports that during August the imports of electrical machinery into Latvia reached a value of 300,000 lats, as compared with 400,000 lats in August, 1930.

A recent Government regulation provides that, as an exceptional measure, the imports of certain goods into Latvia is to be restricted for a period of one year from October 15th. These include incandescent electric lamps, the maximum quantity allowed to be imported being 20,000 kg., and radio-receiving sets and their parts (except radio valves), measuring instruments, resistances of high ohmage, switches, and oxide rectifying apparatus, with a maximum quantity of 15,000 kg. A proportional quota will be allocated at quarterly intervals to countries which export these goods to Latvia.

Gloucester Shop-lighting Competition

A shop and display lighting competition was held at Gloucester from October 19th to 24th, organised by the West Gloucestershire E.D.A. Circle. A silver cup and five other prizes were offered for competition, and in addition, the Corporation Electricity Department encouraged shop-keepers by agreeing to allow 5 per cent. of the total number of kWh consumed in the quarter (equivalent to one week's normal lighting) free to all competitors whom the judges considered to have made a *bonâ fide* attempt in the competition. The number of entries was 107, and the judges were Mr. G. L. Coventon (West Gloucestershire Power Co.), Mr. J. F. Edgell (Corporation Electricity Department), and Mr. E. J. Dowson (E.D.A. Area Officer). A further competition was organised, open to the members of the public for the best forecast of the result of the lighting competition, for which six electrical prizes were offered. Over 4,000 competition forms were applied for. The success of the competition was in a great measure due to the work of the hon. secretary of the Area Circle, Mr. G. L. Coventon.

Dundee and Foreign Goods

Dundee Corporation Finance Committee on October 29th agreed to instruct chief officials of all departments to purchase goods or materials of British manufacture or production where practicable, and the City Chamberlain is to be instructed to indicate items of foreign manufacture in his monthly statement. In the course of a discussion the necessity for the word "practicable" was stressed, and it was pointed out that from 1922 to 1931 the Corporation had saved £16,000 by buying foreign cables.

A Purchasing Association

Purchasing officers of leading industrial firms have formed the British Industrial Purchasing Officers' Association. Considerable economies have already been achieved by a large number of undertakings through the policy of centralising purchasing under the control of a responsible senior official. One of the objects of the new association is to encourage British industry generally to follow this policy. The chairman is Mr. L. H. Swinbank, controller of purchases to Imperial Chemical Industries, Ltd., and the vice-chairman is Mr. R. H. White, purchasing controller of the Marconi group. The hon. secretary, from whom particulars of membership may be obtained is Mr. Stanley Townsend, 51, Palace Street, S.W.1.

"Metrovick" Plant for Hungarian Railways

In connection with a large contract including motors, control gear and sub-station equipment for the Hungarian State Railways, a large first consignment, weighing 1,382 tons, last week left the Trafford Park Works of the Metropolitan-Vickers Electrical Co., Ltd., for Budapest, a total distance of over 1,200 miles. The equipment was loaded on to special trucks at Trafford Park, and will be transported in those trucks, *via* the Harwich-Zeebrugge Train Ferry, the Belgian, German, and Austrian Railways, direct to Budapest. The contract covers the electrification of nearly eighty miles of line from Budapest in the direction of Vienna, to Komarom, and includes the whole of the plant for four 110,000-V sub-stations, and the greater part of the electrical equipment for thirty-six 2,500-h.p. electric locomotives.

United States Electrical Exports

The official statistics of the United States Department of Commerce show that during August the total value of electrical equipment exported amounted to $7,269,138, as compared with $9,668,478 in August last year. For the first eight months of the year the total was $64,860,990, as against $91,675,760. Except in a few isolated cases declines continue in almost all sections. Among the outstanding decreases in August were: D.c. generators, from $86,197 to $28,330; steam turbine generator sets, from $45,422 to $1,277; transformers, from $291,361 to $103,871; switchboard panels (excluding telephone), from $150,498 to $32,587; power switches and circuit breakers (over 10A), from $187,277 to $46,511; fractional h.p. motors, from $294,624 to $114,278; stationary motors, from $297,057 to $99,027; portable electric tools, from $102,878 to $42,367; refrigerators, from $718,599 to $439,585; fans from $102,869 to $26,914; flash-lamp cases, from $88,373 to $40,628; domestic washing machines, from $111,106 to $63,476; domestic vacuum cleaners, from $180,777 to $51,146; cooking ranges and other domestic heating and cooking devices, from $128,980 to $63,515; telegraph apparatus, from $77,182 to $14,007; and telephone apparatus, from $404,842 to $96,008. The only bright features were radio apparatus, the exports of which rose from $1,874,371 to $2,250,962, a.c. generators (from $42,110 to $323,750), converting equipment (from $58,892 to $116,372), and refrigerator parts (from nil to $213,835). Canada, with $1,311,004, continues to head the list of customers, while Argentina ($716,842), and Soviet Russia occupy the second and third places. Exports to the United Kingdom declined by $114,931, and those to Germany by $44,363. American domestic appliances, batteries, and radio receivers are finding favour in the Union of South Africa, the total value of the exports to that country increasing by $142,446 to $368,409.

Imports of electrical equipment into the United States at $270,921 were $61,166 lower than last year, the principal item being $162,864 for electric lamps. Imports of vacuum cleaners fell from $137,096 to $42,985.

New Showrooms at Wellington (Salop)

The first showroom in Shropshire in connection with the electricity scheme of the West Midlands Joint Electricity Authority was opened recently at the Y.M.C.A. buildings at Wellington. At an informal opening ceremony, which was attended by the local public bodies, Alderman Bell, chairman of the Authority, said that in Wellington 200 consumers were connected to the mains, in Newport there were 150, and it was hoped in a short time to supply electricity to Shifnal.

New South African Battery Company

A new company has just begun the manufacture of complete storage batteries in South Africa; this is the first time such an attempt has been made on a commercial scale in the Union. The factory is situated at East London, Cape Province, and the company is entitled the First National Battery Co. One of the founders, Mr. J. F. Jackson, recently spent a year in the United States studying battery manufacture, and his object is to produce a battery specially designed to suit South African conditions.

Hungarian Telephone System

A report from Budapest refers to the possibility of a monopoly being granted for the Hungarian telephone system. The name of the International Telephone and Telegraph Corporation is mentioned in this connection as one of the aspirants, while the principal of an English electrical company is said to be at present in Budapest for the same purpose.

Free Sites in Ulster

The Prime Minister of Northern Ireland announced in a recent speech that to encourage the "Come to Ulster" movement the Government was prepared to grant free sites to manufacturers not already established. Further, it was urging Ulster municipalities to remit rates for some years to give the new industries every opportunity to gain a sure footing.

British Goods for Belgium

The secretary of the British Chamber of Commerce in Belgium informs us that in consequence of the suspension of the gold standard in Great Britain a large number of inquiries have been received at the Chamber for British agencies for Belgium. The goods for which applications for agencies have been received, include electrical material and equipment, electro-mechanical apparatus, insulating material, and radio apparatus, accessories and parts. English companies wishing to place their goods on the Belgian market can obtain particulars of Belgian agencies from the secretary of the Chamber, 82 to 85, Rayguy House, 22, Place de Brouckere, Brussels.

Austrian Foreign Electrical Trade

Large declines in both imports and exports of electrical machines and appliances are recorded in Austria's foreign trade figures for the first six months of the current year. Imports amounted in value to 16,055,000 schillings (schilling=8d.) as compared with 23,777,000 schillings in the corresponding period of 1930, while exports fell from 39,422,000 to 28,763,000 schillings.

The Lord Mayor's Show

An outstanding feature of the Lord Mayor's Show next Monday will be a processional car entered by the British Electrical Development Association. The exhibit is designed to symbolise in a simple way the arrival of the electric age, and presents symbols of light, heat and power—the three principal applications of electrical energy. Arising from a golden base is the white Goddess of Light, who is portrayed emerging from a rising sun and descending to Earth through the Gates of Light. On each side of her the Goddesses of Heat and Power are likewise to be seen emerging from their respective spheres. The London electricity supply companies, the Electric Lamp Manufacturers' Association and the Accumulator Makers' Association have assisted the E.D.A. in the preparation of this display.

An Advertisement Correction

We regret that by a printer's error the fire shown in page 45 of last week's Advertisement Supplement (Berry's Electric, Ltd.) was labelled "Sandown," whereas the correct name is "Sundown."

Tunisian Government Contracts

A memorandum on the general conditions for Government contracts in the Regency of Tunisia, prepared by the Acting British Consul General, at Tunis, has been published by the Department of Overseas Trade (Ref. No. C. 3675). The practice of the French authorities is to give contracts to French firms whenever possible in preference to foreign firms. Favourable consideration, however, is sometimes given, in appropriate cases, to foreign firms who have affiliated companies, branches or factories in France. When calls for tenders are made, they do not always allow sufficient time for preparation and submission of tenders by foreign firms, but in cases where the work involved is considered of sufficient importance to interest foreign firms, it is probable that approved foreign firms will be allowed sufficient time to prepare their quotations and submit tenders.

Trade Announcements

MR. CHARLES WHITE informs us that he has disposed of his interest in Charles White Electrical Co., Ltd., and has severed his connection with the company. He is recommencing business in his own name at 201, Upper Thames Street, E.C.4.

MR. H. SMITH, electrical and radio engineer, of Verulam Road, St. Albans, has opened a new depôt at 72, High Street, Harpenden.

The whole of the MARCONIPHONE Public Address Department, including sales offices, service section, and repair workshops, has now been centralised and has moved to 21, City Road, London, E.C.1. The new telephone number and telegraphic address are National 7011, and Utilitone, Finsquare, London.

Messrs. H. G. MOSELEY & Co., LTD., Birmingham, have appointed Messrs. Paterson & Service, 38, Bath Street, Glasgow, as Scottish sales branch managers. The latter will carry a stock of "Eddo" electrical products.

Sub-contractors' Federation Proposed

The negotiations between the Royal Institute of British Architects and the National Federation of Building Trades Employers in connection with the new form of main building contract revealed the desirability of having a properly constituted federation representative of sub-contracting interests generally. The question is being considered by a group of sub-contracting interests who propose that an association with headquarters in London should be formed entitled "The National Federation of Associations of Specialists and Sub-Contractors," membership to be restricted to associations of trades interested in sub-contracts and specialists' work of the building and allied industries; that the subscription should be nominal to cover expenses; and that the objects of the Federation should be to deal with all questions affecting the interests of sub-contractors and specialists in general (excluding wages), to formulate and to recommend for adoption by the constituent associations courses of action consistent with the general policy agreed upon, and to consolidate the good relationship and understanding between specialists, sub-contractors, architects, surveyors and builders. It is proposed to summon a meeting to be held in London in January next to take further necessary steps. The secretary is Mr. P. Foddering, Finsbury Court, Finsbury Pavement, E.C.2.

Electrical Development at Southwark

A new sub-station and showroom for the Southwark Electricity Department were formally inaugurated by the Mayor on October 30th. The new building is on a site adjoining the Council's existing power station. The additional supply of electricity required will be taken in bulk from the City of London Electric Lighting Co., Ltd., and will be converted at the new sub-station from 11,000 V, 3-phase, 50 cycle, d.c. to 220 and 400 V, d.c., for distribution. Two 33,000-V mains are laid from the Bankside station of the company to the sub-station. The converting plant consists of two 2,000-kW motor-convertors and space is available for a further two convertors, making a total of 8,000 kW. A battery boosting set is also being installed to provide a supply for the auxiliary services of the station. Coincident with these extensions the Council is adding a further ten miles of mains. The showroom has a frontage of 25 ft. and the entrance has a show window on either side. In the front electrical fittings and apparatus are displayed, while at the rear is a demonstration room, where cooking apparatus, water heaters, and radiators will be shown and demonstrated. The lighting fittings and domestic appliances displayed at the official inauguration were supplied by the General Electric Co., Ltd., and Siemens Electric Lamps & Supplies, Ltd. The building extension was carried out to the design of Mr. P. Smart, borough engineer and surveyor, while the plant has been installed under the supervision of Mr. D. M. Kinghorn, borough electrical engineer. The convertor plant was installed by the General Electric Co., Ltd., and the h.p. switchboard was supplied by Messrs. A. Reyrolle & Co., Ltd. The h.p. trunk mains were laid by the City of London Electric Lighting Co., Ltd.

Polish Foreign Electrical Trade

The value of imports of conductors, apparatus and other electrical material into Poland during August totalled 4,276,000 zloty.

Argentine Tariff on Lead Manufactures

A Presidential Decree promulgated on September 26th, covers the tariff treatment of lead and manufactures of lead on importation into Argentina. According to the *Board of Trade Journal* provision is made for ascertaining the average lead prices ruling in the London market, and the Customs are to levy, as an additional duty, the difference between that quotation and the official valuation of 140 pesos per metric ton. An additional duty of the same amount is to be levied on certain lead products, including wires and cables of all sizes, and elements for batteries, and accumulators.

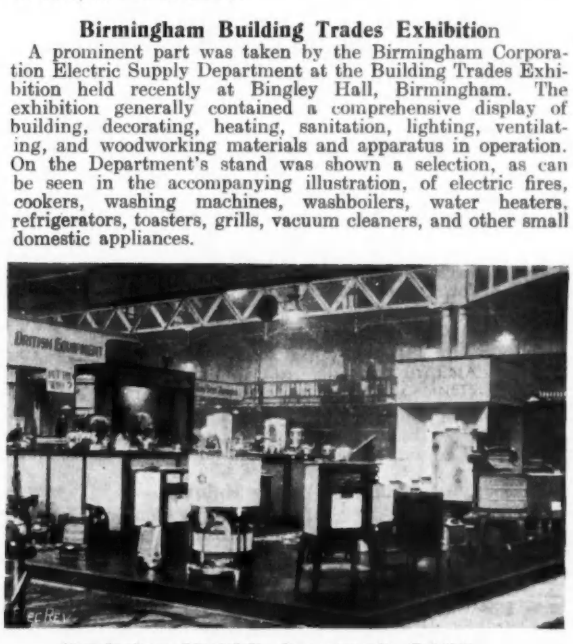
Hints to Commercial Visitors

The latest addition to the "Hints to Commercial Visitors" booklets, published by the Department of Overseas Trade, refers to Switzerland (Ref. No. C. 3669). In addition to particulars regarding fares, travelling facilities, etc., other useful information is given, such as details of the principal exhibitions and fairs and the best time of the year for making a visit.

A similar publication referring to New Zealand (Ref. No. C. 3678) is also available.

Birmingham Building Trades Exhibition

A prominent part was taken by the Birmingham Corporation Electric Supply Department at the Building Trades Exhibition held recently at Bingley Hall, Birmingham. The exhibition generally contained a comprehensive display of building, decorating, heating, sanitation, lighting, ventilating, and woodworking materials and apparatus in operation. On the Department's stand was shown a selection, as can be seen in the accompanying illustration, of electric fires, cookers, washing machines, washboilers, water heaters, refrigerators, toasters, grills, vacuum cleaners, and other small domestic appliances.



Birmingham Electricity Department's Exhibit.

Shanghai Engineering and Railway Exhibition

The Commercial Counsellor at Shanghai has received from the authorities of the Chiao Tung University, Shanghai, preliminary announcements regarding an International Engineering and Railway Exhibition, to be held from December 12th to 27th. The exhibition is to be held under the auspices of the National Ministry of Railways, and all space for exhibits on the University ground or in its buildings will be allotted free of charge. For the convenience of manufacturers and industries not represented in Shanghai, a committee of the University faculty will be arranged to receive and arrange their products for exhibition. Those wishing to take part in the exhibition should notify the chairman and general manager, Mr. S. Z. Wang, Chiao Tung University, Nanyang College, 862, Avenue Haig, Shanghai. The list of articles for exhibition includes complete machines, parts, sections, tools, materials, models, instruments, etc., for use in electrical engineering.

The G.E.C. at Gloucester

In our issue of October 16th, p. 602, we announced the opening of a new branch of the General Electric Co., Ltd., at Magnet House, 2, St. Aldate Street, Gloucester, and we now reproduce, herewith, a photograph of the new showrooms. As will be seen, the building is of three storeys, enabling the company to carry ample stocks of its domestic appliances, while on either side of the show window is an entrance, one for customers and the other for the trade. The manager of the new branch is Mr. J. Williams, formerly of Cardiff.

The G.E.C. Gloucester Branch

Contractors Co-operation in Leicester

At a recent meeting of the Leicester branch of the Electrical Contractors' Association Mr. A. J. Smith moved the following resolution :—" That with a view to avoiding overlapping by individual firms and consequent annoyance of prospective customers, the members of the Leicester branch combine, first by joint advertisement in the local papers and, secondly, by the employment of canvassers. That the work be pooled among the members by arrangements to fit with the requirements of individual firms." Mr. Smith suggested this as the fairest means of dealing with the scheme. The members of the branch had worked together to prevent the work being done by direct labour, the price was fixed for all, and it appeared to him to be a waste of time for the firms to be sending out their own canvassers who would be sure to overlap in their duties and probably cause loss of work through irritation to customers. The resolution was seconded and carried.

A " Pernax " Competition

The Croydon Cable Works, Ltd., sends us a number of rhymes extolling the virtues of its " Pernax " insulating composition for which the authors have been awarded prizes. Enclosed with these is a series of illustrations of the moulding of the material. The company thinks that the material has a number of uses which have not yet been suggested to it.

New Indian Companies

Among the companies recently formed in India are the Athangudi Electric Supply Co., Madras, capital 50,000 rupees; Bengal Batteries, Calcutta (47, Champokur Street), capital 50,000 rupees, to deal in electric batteries; the Ahmednagar Electric Supply Co., Fort, Bombay (Examiner Press Building, Medows Street), 200,000 rupees; and the Eastern Electric Light & Power Co., Fort, Bombay (Bombay House, Bruce Street), 300,000 rupees.

Italian Electrical Imports and Exports

A return recently to hand shows that the imports of electrical machinery, apparatus, and supplies into Italy during the seven months ended July last attained a value of £1,577,760, as compared with £2,308,835 in the corresponding period of 1930. The exports of similar material from Italy from January to July also declined from £547,200 to £510,235.

Trade in British Malaya

A memorandum issued by the Department of Overseas Trade on the state of trade in British Malaya during the first six months of 1931, discloses a serious decrease, both in imports and exports, as compared with the same period of the previous year. The total trade declined by no less than $298,000,000 ($=2s. 4d.), the totals being $758,000,000 in 1930, and $460,000,000 in 1931. The decrease in imports amounted to 37.6 per cent., and in exports to 41 per cent. Imports for the six months exceeded exports by $23,700,000, the totals being $242,100,000 and $218,400,000 respectively. This striking decrease in the total value of exports is accounted for by the continued decline in world prices of primary products, among which Malaya's principal exports, rubber, tin, copra, etc., must be included. Electrical machinery imports declined from $1,081,934 to $571,469, the United Kingdom increasing her share of the total trade from 70.7 to 84.1 per cent.; the percentage of the imports from the United States, the second principal supplying country, fell from 19.2 to 7.6. The United Kingdom with a percentage of 96.8 of the total trade (against 92.8 in the corresponding period of 1930) still retains almost a monopoly for insulated electric wires and cables, the imports of which fell from $1,011,045 to $754,213.

Recent Contracts

The North Western Railway (India) has placed a contract with Messrs. JOHN M. HENDERSON & Co., LTD., for 80-ton Goliath electric travelling cranes.

THE VISCO ENGINEERING CO., LTD., has received an order for 29 air filters having a total capacity of over 350,000 cu. ft. of air per minute, for installation in a large new London building.

A new concrete granary, with a total storage capacity of 25,000 tons of grain, is to be built at the Imperial Dock, Leith, to replace the grain warehouse which was destroyed by fire in January, 1930. The Leith Harbour and Docks Commissioners have now placed the order for the machinery and equipment for the new granary with MESSRS. HENRY SIMON, LTD., the total value of the contract being about £40,000. The order comprises the whole of the conveying, elevating and weighing machinery, the necessary electrical equipment, electrical grain temperature indicating apparatus and a complete dust collecting plant. There will be two main intake bulk conveyors, feeding five elevators within the granary. The grain will be weighed on five 3-ton automatic weighers and delivered by further conveyors either to the storage bins or direct to bulk railway wagons. Below the storage bins will be five conveyors for discharging the grain from the granary. Twelve sack-weighing machines of the portable automatic type will be provided under the delivery bins for loading-out grain in sacks either by rail or road. The temperature recording apparatus will indicate the temperature of the grain in every storage bin at every ten feet of depth. The whole of the machinery will be operated by electric motors.

Trade with Switzerland

A copy of a confidential memorandum on methods of trading, terms of payment and the appointment of agents in Switzerland prepared from information furnished by the Commercial Secretary to the British Legation at Berne, has been issued by the Department of Overseas Trade to firms whose names are on its special register. British firms desirous of obtaining a copy of the memorandum should apply to the Department at 35, Old Queen Street, S.W.1, quoting reference No. C.X 3668.

Social Events

The farcical comedy by Ian Hay and P. G. Wodehouse entitled " Baa-Baa Black Sheep " was performed by the " Metrovick " Dramatic Society every evening from October 19th to 24th, to full houses at the Hall in the M-V Club, Moss Road, Stretford. The principal parts were well sustained by experienced members of the Society, and Miss Olive M. Young was excellent as " Mrs. Pottle."

The annual staff dinner of British Insulated Cables, Ltd., was held on October 30th at the Adelphi Hotel, Liverpool. Sir Alexander Roger, chairman of the company, in proposing the health of the company, said that he felt an element of security had been brought to the business of the country by the results of the election. The company had sailed both smooth and troubled seas, but was weathering the present storm and had no need to fear for the future. Owing to the large number present, the dinner was, as on previous occasions, held in two rooms. In the Sefton Room, Mr. B. Welbourn, chief engineer of the company, proposing the health of the " B.I.," said that, in spite of the difficult times through which the country had been passing, he was confident that we should pull through, and that in this effort the staff of the B.I. would do their full share. A concert was given after dinner, and dancing and whist followed.

The second annual gala of the Henley's staff Swimming Club was held at Holborn Baths on October 28th. Competitors were present from the North Woolwich and Gravesend Works, and Mr. H. G. Gale of North Woolwich acted as starter. All the competitive events were keenly fought and there were exciting finishes in the ladies' team race for the challenge cup presented by Mr. P. Rosling, in which the City office beat the Gravesend Works, and in the men's team race for the cup presented by Sir George Sutton, which was won by the City Office. At the conclusion of the events the prizes were presented by Mrs. Rosling.

Prices of Materials

Messrs. F. Smith & Co. report, November 4th : Electrolytic copper bars, sheets and wire rods, nominal. Electrolytic copper h.c. wire, 7$\frac{1}{8}$d., $\frac{1}{4}$d. inc. Silicium bronze wire, 8$\frac{1}{2}$d., $\frac{3}{8}$d. inc.

Messrs. Edward Till & Co. report, November 4th : India-rubber, para fine, 3$\frac{3}{4}$d., $\frac{1}{4}$d. inc.

Messrs. James & Shakespeare report, November 4th : Copper bars (best selected), sheet and rod, £72, £3 dec. English pig lead, £15 5s., 10s. inc.

New Catalogues and Lists

Brook Motors, Ltd., Empress Works, Huddersfield.—A chart (No. 315) giving net trade prices of motors and starters. Also a price list (No. 316) of extras for standard protected type, squirrel-cage and slip-ring motors.

Feed Water Specialists Co., St. Paul's Square, Liverpool.—Technical publication No. 39, containing notes on the boiler house of the future, erosion in low-pressure blading, boiler explosions, etc. Also a diary for November and December.

Domestic Electrification, Ltd., Townsend House, Greycoat Place, Westminster, S.W.1.—A leaflet describing "Dolphin" cookers.

G. P. Cosway, Ltd., Coton Road, Nuneaton.—An illustrated list of link disconnecting boxes, feeder pillars, service boxes, cartridge fuses, etc.

Drake & Gorham Wholesale, Ltd., 77, Long Acre, W.C.2.—Pamphlet No. 501, illustrating and describing radio receivers, components and accessories supplied by the company.

Air Purifiers, Ltd., 15, Caroline Street, W.C.1.—Particulars of "Jenk's" air purifiers fitted with electric lighting shades.

The Silvertown Company (I.R.G.P. & T. Works Co., Ltd.), Aldwych House, W.C.2.—List of their British-made "Silvertown" manufactures for many specified industries.

Ferguson, Pailin, Ltd., Higher Openshaw, Manchester.—Publications Nos. 74 S.2, 207 A.1, and 6 I.1, dealing respectively with oil-immersed plug fuses, kiosk-type sub-stations, and the company's switchgear installed at the Kirkstall power station.

The Edison Swan Electric Co., Ltd., 123-5, Queen Victoria Street, E.C.4.—Leaflets Nos. CL.664 and CL.709, relating to "Ediswan" architectural lighting equipment and "X-ray" reflectors for shop-window lighting, etc.

J. H. Holmes & Co., Ltd., Hebburn-on-Tyne.—Pamphlet No. 827, describing the "Castle" type "C" variable-speed a.c. commutator motors.

The Marconiphone Co., Ltd., 210-212, Tottenham Court Road, W.1.—Service manuals for a number of the company's radio receivers, loud-speakers, and turn-table motors. Also a series of illustrated leaflets dealing individually with various types of receivers, radio-gramophones and loud-speakers.

The British Home & Office Telephone Co., Ltd., 272/4, Vauxhall Bridge Road, S.W.1.—A folder giving particulars of new "B.H.O.T." automatic telephones, push-button intercommunication telephones and automatic switchboard exchanges.

Sternol, Ltd., Royal London House, Finsbury Square, E.C.2.—A booklet on the lubrication of Diesel and other heavy-oil engines.

Veritys, Ltd., Aston, Birmingham.—A 144-page catalogue (No. 1096) of electric motors, dynamos, control gear, fans, etc.

The Power Plant Co., Ltd., West Drayton, Middlesex.—A neat pad of squared paper advertising the company's power plant gears.

Baxter & Gaunter, Ltd., 221, Tottenham Court Road, W.1.—An illustrated list of electric fires, domestic appliances, floodlight projectors and telephones.

The Northern Steel & Hardware Co., Ltd., 1 and 3, Southgate, Deansgate, Manchester.—A 135-page descriptive catalogue of radio apparatus.

Alliance Wholesale, Ltd., 62, Great Russell Street, W.C.1.—A list giving prices and particulars of electric fires marketed by the company.

Burne-Jones & Co., Ltd., 296, Borough High Street, S.E.1.—Several lists dealing with "Magnum" radio receivers and components. Also a booklet on the "Stenode Radiostat."

British Insulated Cables, Ltd., Prescot, Lancs.—Leaflet P.F.83 relating to enamelled wires.

The Igranic Electric Co., Ltd., 149, Queen Victoria Street, E.C.4.—Publication No. 6663/E, announcing the discontinuance of the manufacture of various types of rectifiers, transformers and electrolytic condensers. A new type of electrolytic condenser is now available.

W. T. Henley's Telegraph Works Co., Ltd., Holborn Viaduct, E.C.1.—A leaflet referring to the "Solon" electric soldering iron.

Vickers-Armstrong, Ltd., Broadway, S.W.1.—A booklet illustrating and describing the "Carden-Lloyd" tractor-truck.

The British Electric Transformer Co., Ltd., Wellington House, Strand, W.C.2.—A broadsheet illustrating the complete range of "Kye" electric lamps.

L. G. Hawkins & Co., Ltd., 30/35, Drury Lane, Kingsway, W.C.2.—Suggestions regarding electrical gifts for Christmas. Also the November issue of "The Link," containing illustrations in colour of several new types of lighting fittings.

Bankruptcy Proceedings

Harden & Chinery, electrical and mechanical engineers, 7, Barnsbury Street, Islington, N.—A sitting of the London Bankruptcy Court was held on October 29th before Mr. Registrar Warmington for the public examination of W. G. Harding and C. H. Chinery, who failed last July with total liabilities of £4,607 (ranking £3,953) and assets nil. The debtors attributed their insolvency to insufficient trade to bad debts, to losses incurred in connection with contracts through "fine" estimating and to delays in delivery of material by manufacturers. The examination of both debtors was concluded.

J. E. Roberts (Roberts & Goldthorpe), engineer and electrician, Crosland Moor Mills, Huddersfield.—Trustee, Mr. H. N. Bostock, Union Bank Chambers, Market Place, Huddersfield, appointed October 26th.

H. Gartside (H. Taylor & Co.), electrician and wireless dealer, the Arcade, Waterfoot.—Trustee, Mr. J. D. Turner, Byrom Street, Manchester, Official Receiver, released October 7th.

A. S. Deacon (London Wireless Co.), wireless dealer, 32, London Road, Derby.—Last day for receiving proofs for dividend, November 16th. Trustee, Mr. F. E. Bendall, Midland Chambers, Warrington Passage, Corporation Street, Birmingham.

S. E. Hunt, electrical engineer and contractor, 8a, Torwood Street, Torquay.—Supplemental dividend of ½d. in the £, payable November 4th at 4, Charterhouse Square, E.C.

F. M. Crane (Sutton Electrical Installation Co.), electrician, 11, Kirkley Road, Merton Park, Surrey.—Last day for receiving proofs for dividend, November 7th. Trustee: Mr. C. R. Waterer, 29, Russell Square, W.C., Official Receiver.

R. F. Davis, electrical engineer, 21, Derringham Street, Hull.—Receiving order made, October 20th, on debtor's own petition. First meeting, November 10th, at the Official Receiver's office, 37, Scale Street, Hull. Public examination, November 16th, at the Guildhall, Alfred Gelde Street, Hull.

W. P. Barnell, electrical engineer, 25A, Sheep Street, Northampton.—First and final dividend of 5s. 4d. in the £, payable November 6th at the Official Receiver's office, 6, The Parade, Northampton.

Company Liquidations

Enterprise Manufacturing Co., Ltd.—Under the voluntary liquidation of this company the accounts show liabilities of £6,976, against net assets of £2,808, and a total deficiency of £8,619 with regard to contributories, the issued capital being £4,452. Mr. H. P. Naunton, Assistant Official Receiver, reports that the company was incorporated as a private company in 1917 for the purpose of taking over the "Enterprise Electric and Manufacturing Co.," and to carry on business as dealers in electrical instruments. During the early part of 1923, the company arranged a bank overdraft not exceeding £2,000. The business then progressed favourably until Mr. Barrie (one of the directors) resigned in May, 1929, when creditors commenced to press for payment. A meeting of creditors was held in July, 1929, and a committee of creditors was appointed. Shortly afterwards the Westminster Bank (holders of the debentures) appointed Mr. P. Leask as receiver and manager on its behalf. The failure of the company is attributed by a director chiefly to overtrading, the contributory causes being heavy overhead expenditure and shortage of capital. As a result of statutory meetings of creditors and contributories held on June 5th last, the Court on June 22nd appointed Mr. H. C. S. Bell, 22, Bedford Row, W.C.1, as liquidator, with a committee of inspection.

Sun-ray Electric Lamp Co., Ltd., Buchanan Buildings, 24, Holborn, E.C.—The accounts filed under the liquidation of this company show liabilities of £402 against assets of £37, with a deficiency of £665 in regard to contributories, the issued capital consisting of 300 ordinary shares of £1 each. The failure of the company is attributed by the directors to the unwarranted action of the petitioning creditors in (a) refusing to supply further goods, and (b) presenting the winding up petition when the company was adhering to a condition mutually agreed to in respect of the payment of its debt. The petitioners, however, maintain that the conditions were not adhered to and that their subsequent action was fully justified. In the opinion of the Official Receiver the failure is directly attributable to mismanagement on the part of the directors in that the working capital placed at the company's disposal was totally inadequate, and the overhead expenses were excessive and not justified by the financial position of the company.

Burndept Wireless (1928), Ltd., Aerial Works, Blackheath, London, S.E.—The adjourned meeting of the creditors was held on October 30th, at Winchester House, E.C. A statement of affairs was submitted which showed ranking liabilities of £47,637, of which £25,673 was due to the trade, and £21,964 to the 6 per cent. ten year note holders. According to the books the assets totalled £187,464, and they were estimated to realise £68,689. From the latter figure had to be deducted the costs of carrying on the business as a going concern since the appointment of the Receiver last February, and £13,476, and £33,852 in respect of debenture and preferential claims. The net assets therefore were £21,361, leaving a deficiency as regarded the creditors of £26,276. The issued capital of the company was £155,005, and as regarded the shareholders there was a deficiency of £181,281. A resolution was passed confirming the voluntary liquidation of the company, with Mr. E. Maloney, Receiver for the debenture holder, as liquidator.

Elm Manufacturing Co., Ltd.—Meetings, December 1st, at the offices of Thorpe & Hutton, 5, John Street, Bedford Row, W.C., to receive an account of the winding-up by the liquidator, Mr. K. D. Hutton.

Louth Electric Service, Ltd.—Winding up voluntarily. Liquidator, Mr. C. Turner, 155, Norfolk Street, Sheffield.

Private Arrangements

E. H. Finn, electrical engineer, 118, Copenhagen Street, London, N.1.—A meeting of creditors was held on October 26th at the offices of Messrs. Corfield & Cripwell, Balfour House, Finsbury Pavement, E.C., when Mr. W. A. J. Osborne submitted a statement of affairs showing liabilities of £1,980, of which £1,805 was due to unsecured trade creditors, and £175 to loan creditors. The total assets amounted to £581, from which had to be deducted preferential claims of £21, leaving net assets of £560, or a deficiency of £1,420. The debtor stated that although he was not in a position to make the creditors an offer of a composition at the present time, he was quite confident that he would eventually be able to pay all his creditors 20s. in the £. It was decided that the estate should be dealt with under a deed of assignment already executed, and a committee of inspection was also appointed. The following are the principal creditors:—

	£		£
Falk, Stadelmann & Co., Ltd.	438	Walsall Conduits, Ltd. ...	229
General Electric Co., Ltd.	276	H. Allwright	75
Henley's Telegraph Works, Ltd.	509	A. Allwright	100

Charles White Electrical Co., Ltd., Upper Thames Street, London, E.C.—A meeting of the creditors was held recently at the Institute of Chartered Accountants, E.C., when the auditor of the company stated that arrangements had been made for one of the directors to acquire the other directors' interests in the company and that the proposed liquidation would not therefore take place. It was anticipated that the creditors would receive 20s. in the £, because the book debts and cash in hand were more than sufficient to pay the creditors in full, and there was a considerable surplus if the directors' claims were excluded from the statement of affairs. The meeting was adjourned.

Electricity Supply

Lighting, Domestic, Power

Aberdeen.—YEAR'S WORKING.—In spite of reductions in the charges for electricity and for the hire of motors involving a loss to the City Electricity Department of approximately £30,200, there was a net profit of £9,323 on the working of the electricity undertaking for the ten months ended May 31st last. In his annual report Mr. J. A. Bell, city electrical engineer and manager, states that the total revenue of the undertaking amounted to £206,420, while the working expenditure was £91,093, thus leaving a gross profit of £115,327. Of this, sums of £55,419 and £29,012 respectively were required for sinking fund instalments and interest on capital. Although the accounts are only for ten months (due to the altered date of the financial year) the following figures relating to the complete financial year 1929-30 may be of interest for comparison:—Total income, £255,904; working expenditure, £104,117; gross profit, £151,788; net surplus, £30,432. During the period under review £46,354 was spent on capital account, making a total of £1,608,642 now invested in the undertaking. Sales of electrical energy totalled 35,874,031 kWh, the figure for August 1st, 1929, to July 31st, 1930, being 38,931,122 kWh. Although referring to only ten months, the number of installations (459) carried out under the assisted wiring scheme was the largest since the scheme was started, the total now being 1,571. Altogether 1,640 new consumers were connected, making a total of 16,274.

Australia.—VICTORIAN ELECTRICITY COMMISSION'S YEAR'S WORKING.—For the year ended June 30th last the Electricity Commission of Victoria had a total revenue of £2,544,894 and an expenditure of £2,562,846, leaving a net loss of £17,952. Depreciation of exchange accounted for £58,965 and but for this there would have been a profit of £41,013. Electricity supply showed a profit of £146,887 and Geelong tramways a loss of £19,346. Mr. Cain, Minister in charge of electrical undertakings, states that the figures are not comparable with those of previous years, because they include the returns for ten months from the undertakings in Melbourne and Geelong taken over from the Melbourne Electric Supply Co., Ltd., on September 1st, 1930. The demand for electrical energy, compared with 1929-30, decreased by 16 per cent. for industrial purposes in the metropolitan area, and there was a slight decrease in the commercial requirements; on the other hand, domestic consumption increased by 8 per cent. There was a loss of £21,036 on briquette manufacture. Expenditure up to June 30th last on the major extension of the main electricity supply system was £1,237,800. It was originally intended to have the first of three new 25,000-kW generating units at Yallourn ready this winter and to install the others as required, completing the extension before 1935. After contracts had been let, however, the trade depression developed and demand for power decreased, and restrictions on borrowing curtailed the programme of extensions to country centres. While the electricity sold has been reduced, the peak load on the Commission's system has gone up from 97,000 kW in 1930 to 103,600 kW in 1931, which is beyond the normal capacity of the present system. The installation of the first unit has been deferred for nine months.

Birmingham.—PROGRESS DURING SEPTEMBER.—At a recent meeting of the Corporation Electric Supply Committee it was stated that during the month of September 1,780 new consumers were connected, making a total increase of 24,995 in the past year, which breaks all previous records of the undertaking. Additional consumers' apparatus connected during the month amounted to the equivalent of 18,000 60-W lamps in the lighting section and to nearly 4,500 h.p. on the power side. Sales of electrical energy for the September quarter increased by 6,250,000 kWh (about 8¼ per cent.) and several additional agreements for bulk supplies for manufacturing purposes were approved.

Bishop Auckland.—SUPPLY TO SCHOOL.—The Cleveland and Durham County Electric Power Co. is to provide an electricity supply to the Council School.

Brighton.—CHRISTMAS LIGHTING SCHEME.—A scheme for illuminating all the main thoroughfares of Brighton by means of festoons of coloured lamps during the Christmas shopping season is being considered by the Western Brighton Trades Association.

Canary Islands.—ELECTRICAL DEVELOPMENT.—Interesting information regarding the electricity supply industry in the Canary Islands is contained in a Department of Overseas Trade report preferred by Mr. J. P. Trant, British Consul at Teneriffe. After passing through various American hands, since their original joint purchase about two years ago by a Spanish syndicate, the public utility electrical plants in Santa Cruz and Las Palmas have recently been taken over by the Central Public Service Corporation of Chicago. These plants include two power stations in Las Palmas, and another in Santa Cruz, as well as the electric tramway system in Las Palmas. The local designation given to this subsidiary is "Union Electrica de Canarias." It is probable that within a year the older of the two stations in Las Palmas will be shut down, leaving in operation the modern Cicer plant, erected in 1928. The generating capacity of the Cicer plant is 8,500 kW (annual output 5,400,000 kWh) and that of the Santa Cruz plant 3,700 kW (annual output 3,900,000 kWh). Three-phase a.c. will shortly be the standard system for all plants. At present the pressures of the Cicer plant are 127 V residential and 230 V power; and those of the Santa Cruz plant 110 V residential and 190 V power. Las Palmas stations not only serve the city of Las Palmas and its port, but also the towns of Arucas, Telde, Tamaraceite, San Lorenzo, Tenoya, Bañaderos, Aguimes, Ingenio, Tafira and Santa Brigida. The Santa Cruz plant, in addition to supplying the capital, also serves La Guesta and La Laguna, and will shortly, by a 22,000-V line, be supplying Tacoronte, Orotava, Icod, Garachico, Los Silos and Buenavista. The Santa Cruz station will also soon be supplying power to the electric tramway system of Teneriffe. A project is in hand for the construction for the same company of a new 4,000-h.p. power station in Santa Cruz at a cost of Ptas 6,000,000, whereupon the existing plant will be closed down. Other small independent generating stations exist in Guimar (hydro-electric), Puerto de la Cruz, Santa Cruz, La Palma and elsewhere.

Chester-le-Street. — SUPPLY TO SCHOOL.—The County Education Committee is to make arrangements with the County of Durham Electrical Power Distribution Co., Ltd., for supplying electricity to the new Bullion Lane School.

Continental.—ROUMANIA.—The Swedish company, Electro-Invest, which is affiliated to the A.S.E.A., has concluded an agreement with the Roumanian town of Brasso (Kronstadt) for the supply of electricity for a period of 25 years. In the administration of the concession there will be some sort of collaboration between the Swedish company and the Belgo-Italian electricity company, "C.I.B.E." The Electro-Invest company already holds concessions for the supply of electricity to several towns in Jugo-Slavia and one in Poland. Negotiations for further concessions in Poland and Roumania are proceeding. In connection with the new concession, the A.S.E.A. will receive orders for turbines, generators, transformers, cables, etc., having an estimated total value of Kr. 2,500,000.—*Reuter's Trade Service* (Stockholm).

ITALY.—According to *L'Energia Elettrica*, the capacity of the electric power stations in Italy at the end of August last amounted to 4,365,000 kW, as compared with 4,223,000 kW at the corresponding date of 1930, an increase of 3.36 per cent. Of the total, hydro-electric plants are responsible for 3,583,000 kW, and steam and internal combustion engine stations for 782,000 kW. The output of electricity in Italy during the eight months ended August last is estimated at 6,574,054,000 kWh, as against 6,801,513,000 kWh in the corresponding period of 1930, a decrease of 3.34 per cent.

Dumfries.—ELECTRICAL DISTRIBUTION SCHEME.—The County Council has decided to proceed with an electrical distribution scheme at an estimated cost of £202,000. An earlier scheme costing £209,695 was adopted by the Council in February last, the total cost of the whole scheme being estimated at £451,512. It is stated that 215 miles of distribution mains are to be erected throughout the county, and that the tender of Callender's Cable and Construction Co., Ltd., has been accepted.

Eastbourne.—YEAR'S WORKING.—We have received from Mr. J. K. Brydges, borough electrical engineer, a copy of his annual report together with a statement of accounts of the electricity undertaking for the year ended March 31st last. The total revenue amounted to £137,882, as compared with £121,383 in the preceding year, while the working expenditure increased from £78,956 to £90,834. There was a gross profit of £47,049, as against £42,427. Loan charges and income tax rose by £11,628 and there was a net profit of £944 (£6,233). During the year £100,237 was spent on capital account, making a total of £802,189 now spent on the undertaking. Sales of electricity increased from 15,124,322 to 19,756,297 kWh and the maximum demand from 8,065 to 9,145 kW. A big advance was shown in the popularity of the all-in tariff, sales of energy under this heading rising from 2,831,877 to 7,923,486 kWh. The average price obtained per kWh fell from 1.67d. to 1.45d. A partial supply from the Central Electricity Board was received on October 9th, 1930, and later arrangements were made to receive additional supplies. On April 19th the generating plant at the power station was entirely shut down and the total requirements of Eastbourne were supplied from either one of the only two power stations, Brighton or Eastbourne, at present connected to the first section of the grid so far completed on the South Coast. New consumers numbered 629, bringing the total at the end of the year to 12,952, while there was a marked increase in the demand for electric cookers, water heaters and other domestic appliances.

Glasgow.—PROGRESS DURING SEPTEMBER.—Under the Corporation Electricity Department's scheme 498 houses were wired in September, making a total of 34,418, while hired appliances numbered 26, bringing the total to 20,472.

Godalming.—NEW SWITCHING STATION.—The inauguration of the new switching station of the Mid-Southern District Utility Co. (formerly the Aldershot Gas, Water, and District Lighting Co.) took place at Godalming on October 28th.

Harwich.—YEAR'S WORKING.—The Corporation Electricity Department (engineer: Mr. J. H. Shepherd) recorded a net profit of £1,864 for the year ended March 31st last, as against £1,305 in 1929-30. Revenue rose by £1,423 to £15,213, while the working expenditure amounted to £7,343, as against £7,146. The gross profit was £7,870 (£6,644). Electrical energy sold totalled 742,466 kWh, the average price obtained per kWh being 4.022d. The number of consumers increased from 2,589 to 2,781.

Hastings.—LOAN.—The Corporation Electricity Committee is applying for sanction to the borrowing of £10,000 required for house services.

Irish Free State.—KILMALLOCK (Co. LIMERICK).—The Kilmallock Electric Light and Power Co., Ltd., has decided to make the following reductions in electricity charges:—Lighting: From 1s. to 10d. per kWh. Power: From 6d. to 4d. per kWh. Heating: From 3d. to 2d. per kWh.

Isle of Man.—ELECTRICITY SCHEME.—The electrification of the Isle of Man has been brought a step nearer by the circulation this week of a Bill to set up a Manx Government Electricity Board to administer the proposed scheme. The Bill provides that electricity shall be taken in bulk from the Douglas Corporation generating plant, and distributed throughout the island, with power reserved by the Board to set up generating plant of its own should it be considered advisable. The scheme would be financed by way of loans, on which the Manx Government would pay half the interest, and any deficiency on the working of the scheme would be met by the levying of a rate on the areas electrified. The Bill, which will come before the Manx Legislature for consideration this session, has been drafted to replace a Bill which provided for the granting of a monopoly to a subsidiary company of the General Electric Co., Ltd., and which was rejected by the Manx Legislature last winter.

Johnstone (Renfrewshire).—REFUSE DESTRUCTOR.—The Town Council has instructed the borough surveyor to obtain plans and estimates for a refuse destructor.

Lancashire.—LIFTS FOR WHISTON INFIRMARY.—The County Council recommends the provision of electric lifts at the Whiston Infirmary at a cost of £2,300.

ELECTRICAL INSTALLATION AT INSTITUTION.—The County Council has also authorised the provision of electricity in place of gas at the Ulverston Institution at a cost of £888.

London. — STEPNEY. — The Borough Council Electricity Department (engineer and manager: Mr. W. C. P. Tapper) shows an increase from £369,837 to £389,201 in its total revenue for the year ended March 31st last. Working expenses were £192,656, as against £180,092 in the preceding year, while the gross profit amounted to £196,546 (£189,745), to which was added income from other sources, making a total of £200,395 available. Capital and other charges rose by £15,849 to £187,576, and there was a net surplus of £12,819, as compared with £20,615 in 1929-30. Capital expenditure during the year amounted to £163,830, the principal items being £34,119 for buildings, £66,223 for machinery and £26,423 for mains; the total now invested in the undertaking is £2,494,589. Notwithstanding a decrease of 575,851 kWh in bulk supplies, the total sales of electricity increased from 75,041,236 to 77,722,778 kWh, the maximum load rising from 35,180, to 36,350 kW. New consumers numbered 2,595, making the total at March 31st last 24,571. The average revenue per kWh sold increased from 1.148d. to 1.170d.

CAMBERWELL.—The London County Council is, to invite selected firms to quote for electrical installations at three blocks of tenements on the Glebe Estate.

Maidenhead.—MAINS EXTENSIONS.—The Town Council is to apply for sanction to the borrowing of £6,000 for mains extensions.

Maidstone.—LOANS SANCTIONED.—The Town Council has received sanction to loans of £10,000 for mains, and £5,000 for domestic purposes.

Morocco.—PROGRESS IN ELECTRICITY SUPPLY.—According to the annual report of the Société Marocaine de Distribution d'Electricité, the sales of power in the Casablanca district during 1930 amounted to 23,281,457 kWh, as compared with 20,019,481 kWh in the preceding year, an increase of 16.3 per cent., while in the Rabat-Salé area they reached a total of 3,691,674 kWh, as against 2,880,351 kWh, an advance of 28.1 per cent.

Nottingham.—YEAR'S WORKING.—A very successful year is disclosed in the accounts of the Corporation Electricity Department for the twelve months ended March 31st last. Although revenue advanced from £388,665 to £438,560, there was an increase of only £9,951 in the working expenditure (£196,390), while the gross profit at £242,171 was £39,944 higher than in the preceding year. After providing for capital and other charges there was a net profit of £40,771, as against £18,550 in 1929-30. During the year £261,322 was spent on capital account, making a total of £3,161,143 now invested in the undertaking. Electricity sold increased from 51,166,356 to 57,737,645 kWh and the maximum supply demanded from 25,863 to 28,376 kW.

Port Seton.—LIGHTING SCHEME.—The extension of the harbour has now been completed and the Harbour Commissioners have decided to install electric arc lamps at the quay and do away with the present gas system.

Reigate.—BULK SUPPLY.—The Town Council has sealed an agreement with the London and Home Counties Joint Electricity Authority for a supply of electricity in bulk.

Ripon.—LIGHTING EXPERIMENT.—The Corporation General Purposes Committee has asked the Electricity and Gas Departments each to install one lamp in the High Skelgate area and to submit records of costs.

CHRISTMAS SHOP-WINDOW LIGHTING.—The Corporation Electricity Committee has agreed to fix a special rate of 3d. per kWh for shop-window lighting during December, provided that 50 per cent. more than the usual quantity of energy is consumed.

Roxburgh.—SUPPLY TO NEWCASTLETON.—At a recent meeting of the County Council it was suggested that a plebiscite should be taken of the inhabitants of Newcastleton to ascertain their wishes regarding the introduction of electricity from Dumfriesshire. It was decided to defer the matter until further information was received regarding the Dumfries supply.

Shipley.—SUPPLY TO HOUSING ESTATE.—The Urban District Council Electricity Committee is to prepare a scheme for the supply of electricity to 80 houses now being erected at Wrose Road by Messrs. A. & F. Mellor.

South Africa.—ELECTRICAL DEVELOPMENTS.—The municipality of Benoni, Transvaal, is spending £37,000 on an electrical extension scheme. A new power station is also proposed at Kroonstad, Orange Free State, at an estimated cost of £41,000, while Port Shepstone, Natal, is to install additional electrical power equipment costing £4,500.

CAPE TOWN.—The revision of tariff rates involving concessions to consumers estimated at £45,000 per annum, is recommended by the Corporation Electricity Committee.

South Cave (Yorks).—INAUGURATION OF SUPPLY.—A supply of electricity provided by the Hull Electricity Department was switched on at South Cave on October 29th by Mrs. Walter Waudby.

Stalybridge.—REDUCTION IN WATER-HEATING CHARGES.—The Stalybridge, Hyde, Mossley, and Dukinfield Tramway and Electricity Board has reduced its charge for electricity for water heating to ½d. per kWh to consumers charged at a flat rate of 1d. per kWh for heating. Radiators are to be let out on hire at the following rentals: 1 kW, 1s. 6d. per quarter; 2 kW, 2s. 6d. per quarter.

Stretford.—EXTENSIONS TO IRLAM AND CADISHEAD.—The Stretford and District Electricity Board is to apply for an Order to extend its area of supply so as to include Irlam and Cadishead, and a scheme is in hand to supply Irlam and district with electrical energy for public and private use at a cost estimated at £100,000. By special agreement the Lancashire Steel Corporation, Ltd., is to be included in the scheme in respect of steel works in the district. The charges to Irlam consumers (other than the Lancashire Steel Corporation, Ltd.) are to be equal to those in the rest of the Board's area, with the addition of a sum equivalent to 15 per cent. of the charges during a period of not exceeding five years.

Sutton Coldfield.—PRICE REDUCTIONS.—Concessions to consumers amounting to £4,000 annually are involved in new electricity tariffs introduced by the Corporation Electricity Department. The following are the principal alterations:—Lighting flat rate: A reduction of ¼d. per kWh. Contract rate: Reductions in fixed charges for premises having a rateable value of over £40 per annum. Heating and cooking: A reduction of ¼d. per kWh for the first 2,000 kWh per quarter. Industrial lighting and power: A reduction of ¼d. per kWh. Maximum demand rate for business premises: £10 (instead of £15) per kW of maximum demand plus 1¼d. (2d.) per kWh consumed. Meter rent has been abolished.

Torquay.—BULK SUPPLIES.—The Corporation Electricity Committee has received an application from the Teignmouth Electric Lighting Co., Ltd., for a supply in bulk for transmission to the Dawlish Electric Light & Power Co., Ltd., and has decided to raise no objections, subject to the approval of the Electricity Commissioners. The Committee has also agreed upon terms for a bulk supply to the Urban Electric Supply Corporation at Totnes.

LOAN.—Application is to be made by the Electricity Committee for sanction to a loan of £15,000 for mains and services.

SUPPLY TO HOLNE.—A supply of electricity is to be given to the parish of Holne at a cost of £1,300.

FRINGE ORDERS.—The Electricity Commissioners have advised the Corporation to apply for Fringe Orders to supply electricity in Modbury in order to obviate the delay which would otherwise occur if the granting of the Special Order is awaited before any steps were taken to supply the area affected. The Corporation has decided to make the necessary applications and also to obtain sanction to the borrowing of £6,442.

Warmsworth (Yorks).—TRANSFER OF UNDERTAKING.—The Electrical Distribution of Yorkshire, Ltd., is taking over the distribution of electricity in the Warmsworth area, hitherto operated by the Doncaster Collieries Association, Ltd. The transfer, which is under the national grid scheme, took effect on October 31st, and an almost immediate extension of facilities is promised to consumers.

Warrington.—NEW SHOWROOMS.—The Corporation Electricity and Gas Committees have agreed upon plans by Mr. S. A. Mackay, architect, for the erection of joint showrooms in Buttermarket Street and have decided to obtain tenders for their erection.

West Usk.—SPECIAL ORDER.—The Electricity Commissioners have submitted to the Minister of Transport for confirmation a Special Order made by them authorising the South Wales Electrical Power Distribution Co. to supply electricity in the urban district of Blaenavon and parts of the rural districts of Abergavenny, Pontypool and Magor.

Traction

Blackpool.—YEAR'S WORKING.—We regret that our review of the year's working of the Corporation Transport Department was inadvertently inserted under " Bradford " in a few copies of our last issue.

Chesterfield.—TRAFFIC SIGNALS.—The Corporation Watch Committee is to install traffic signals at a cost of £260.

Continental.—RUSSIA.—The work of electrifying several new railway lines in Russia has recently been commenced. In the Urals, operations are in progress on the Lunevsk branch, which will be electrified for a distance of 113 km. Work has already begun in the Leningrad-Oranienbau district, with a branch to Gatchina, and on the Mineralnye Vody branch, in the Caucasus, from Mineralnye Vody Station to Kislovodsk; the length of each of these electrified branches will be 72 km. The first Soviet electric locomotives will be built at the Kolomna factory not far from Moscow.

AUSTRIA.—The *Financial News* states that the Austrian State Railways are negotiating with a Paris financial group with regard to financing the electrification of the Semmering and Tauern State lines.

FRANCE.—The Transport Commission has authorised the abandonment of a further thirteen tramway lines in Paris.

ITALY.—Several sections of line in Northern Italy were changed over from steam to electric traction on October 28th.

London.—FALL IN L.C.C. TRAMWAY RECEIPTS.—During the fourteen weeks July 15th-October 14th, 184,717,009 passengers were carried on the London County Council's tramway system, a decrease of 5,390,524 as compared with the corresponding period of last year. The total receipts for the period April 1st-October 14th declined by £56,045 to £1,107,456.

REQUEST FOR TROLLEY-'BUSES.—The Brentford and Chiswick Urban District Councils have asked the London United Tramways, Ltd., to provide trolley-'buses in Boston Road.

Newcastle.—DIESEL-ELECTRIC TRACTION.—A new Diesel-electric rail car built by Messrs. W. G. Armstrong-Whitworth & Co., Ltd., Newcastle, ran trials last week. The new locomotive, which has a speed of 60 m.p.h., was inspected by a number of officials of the London and North Eastern Railway Company.

South Africa.—TRAMWAYS AND OMNIBUS COMPETITION.—The Transportation Board has refused to allow penny fares on the omnibuses operated by the Cape Town Tramways Co. As this does not affect the penny fares on the tramcars the company states that it may be forced to place more tramcars in service in order to compete with other omnibuses.

Wolverhampton.—MORE TROLLEY-'BUSES.—The Town Council has decided to convert three motor-omnibus routes on the south-west side of the town to trolley-'bus operation at a cost of £37,750. The total length of these routes is nearly 8½ miles and will increase the mileage of trolley-'bus routes operated by the Corporation to 46 miles.

Telegraph and Telephone

Canary Islands.—TELEPHONY.—A report from the British Consulate at Teneriffe to the Department of Overseas Trade on economic conditions in the Canary Islands states that the islands are served by the Compania Telefonica Nacional de Espana, which took over the existing telephone system in the islands in 1924 and has considerably extended and improved it since then, forming a complete, although isolated, network over the island group. The number of subscribers now amounts to nearly 3,000, mostly in Santa Cruz and Las Palmas, and there are 72 separate call stations in seven different islands, although each insular system is separated from the others with the exception of that of Grand Canary and Teneriffe, which since October, 1929, have been connected by a direct submarine cable, costing one million and a quarter pesetas, stretching from Santa Cruz to Las Palmas. This company also inaugurated in January, 1931, at a cost of one million and a half pesetas, a wireless telephony station in Santa Cruz, by means of which calls can be made to Madrid and from thence to other Continental capitals and to London. In addition, there is another local telephone service in the island of Teneriffe, operated by the Cabildo Insular, or County Council of the island. This is the product of a concession from the Central Government, granted in 1915, which has only about ten more years to run, when the system reverts to the State. The system comprises 95 stations, mostly in the rural districts, and possesses 862 individual subscribers. The equipment of the system is very mixed, Ericsson material predominating; but recently a Standard Electric automatic system was installed in the region of Icod-Daute, which is the first automatic system to be installed in the Canary Islands. Recently also the Standard Co.'s multiple luminous exchanges were installed in two of the principal stations.

RADIO.—The Transradio Company of Spain has stations at both Santa Cruz and Las Palmas, for wireless communication with other shore stations, Madrid, Barcelona, Cabo, Juby, Rio de Oro, as well as with passing ships. The Las Palmas station at Guanarteme is a new one, having only been erected in 1930, the former one at Melenara having since been closed down. Wavelengths used for communication with ships, 600-1,300 metres. Distances reached by day about 1,000 miles, by night indefinite. Santa Cruz station, wavelength to ships, 600 metres; distances reached by day 600 miles, and by night 1,500 miles. The Santa Cruz plant is somewhat out of date, but plans are in hand for the erection of a new and more powerful station at La Cuesta in the near future.

Irish Free State.—TELEPHONY.—Throughout the Free State there is now one telephone for every 95 persons. Subscribers number 21,093 and the number of instruments in use is 31,251. This year 20 new rural exchanges and 21 additional public call boxes have been opened, raising the respective totals to 739 and 1,274. So far this year trunk calls have totalled 1,196,020, compared with 1,960,000 in the whole of 1930. Automatic service is being extended. In Dublin there is one telephone per 42 people, in Limerick one per 76, in Cork one per 54, in Greystones and Dalkey one per 19, in Donegal one per 67, and in Thurles one per 282 persons.

Jugo-Slavia.—COMMUNICATION WITH GREAT BRITAIN.—The Postmaster-General announces that a public telephone service is now available between all parts of Great Britain and Northern Ireland and the principal towns in Jugo-Slavia.

South Africa.—DURBAN TELEPHONE ARBITRATION.—The dispute between the Government Postal Department and the Durban Municipality in connection with the taking over by the Post Office of the municipal telephone system is to be settled by arbitration. Durban has appointed Mr. G. MacKeurtan, K.C., to conduct its case. He is expected to proceed to England shortly to study the automatic telephone system, and it is anticipated that the Court will select an engineer from England who will act as its representative. The difference between the price offered by the Post Office and that asked by Durban is over £1,000,000.

Southampton.—WIRELESS BEACON.—It is understood that the Nab Tower, off the Isle of Wight, which ships have to round on entering and leaving the Solent and Southampton docks, is to be equipped with a radio beacon. Experiments are also being made with a submarine oscillator.

Sweden.—TELEPHONE RATES.—As from November 1st Swedish telegram charges to foreign countries, except Denmark and Norway, and also telephone charges to non-European countries, were increased. The increase, which is due to the depreciation of the Swedish currency in relation to the gold franc, was to be small. The present telephone charges to European countries will be maintained, at least for the time being.—*Reuter's Trade Service* (Stockholm).

U.S.A.—PROPOSED ACQUISITION OF FRENCH CABLE CO.—The International Telephone and Telegraph Co. is negotiating for the control of the French Cable Company, according to the *Wall Street Journal*. The French Cable Company owns three cables between the United States and France, as well as others between France and French Colonies.—*Reuter* (New York).

Radio

Australia.—STATE CONTROL.—The Commonwealth Prime Minister has announced that the Government has decided to abolish private control of broadcasting at the end of June, 1932, and to substitute therefor a corporation similar in constitution to the British Broadcasting Corporation.—*Reuter* (Canberra).

Canary Islands.—BROADCASTING.—There are two small broadcasting stations at Santa Cruz and Las Palmas, of recent erection, sponsored by the Philips Radio Company. The wavelength used is 250 metres. There are, up to date, about 400 radio sets in Teneriffe and 300 in Grand Canary. Contact is fairly readily made on a short wavelength with the principal broadcasting stations in the United Kingdom and on the Continent, as well as in the United States, but conditions are very variable. The short wave gives the best results during the summer months and the long wave in the winter.

Italy.—NEW STATIONS.—New stations inaugurated on October 28th were those at Trieste, of 15 kW and 247.7 metres; that at Florence, of 30 kW and 501 metres, now used by Milan, which will use an increased power of 75 kW and Naples' 331.4-metre wavelength, the latter probably adopting a common wave; and the 1.5-kW new transmitter at Bolzano, which will use Seville's 368.1-metre wavelength. The Turin station's wavelength will be 273 metres.

London.—CAMPAIGN AGAINST " PIRATES."—As a result of the Post Office campaign against wireless " pirates " in London, which lasted four weeks, £125,000 has been obtained in new licence fees, of which the B.B.C. will get at least £70,000. According to " The Times," about 250,000 new licences were taken out in the four weeks. There are 350 prosecutions now in hand, while several hundreds more are being considered. The moral effect of the campaign is indicated by the fact that 146,000 new licences have been taken out in the provinces, where the campaign has not yet been begun.

Mansfield.—RADIO EXCHANGE.—The Town Council has approved of the Highways Committee's recommendation to permit the inauguration of a radio relay service in the town.

Russia.—STATE SERVICE.—At present 55 broadcasting stations are operating in the Soviet Union, their power varying from 0.3 to 100 kW. Some belong to the trade unions and others are controlled by the People's Commissar for Posts and Telegraphs. The listeners' tax was abolished two years ago and in January last the registration of sets ceased also. Some 60 languages are used for broadcasting.

Contract Information

When "Contracts Open" are advertised in our "Official Notice" pages the date of the "Electrical Review" containing the advertisement is given in parentheses below

Contracts Open

Australia.—MELBOURNE.—December 9th. Victorian Railway Commissioners. Underground cables and junction boxes. (A.X. 11152.)*

Belgium.—BRUSSELS.—November 18th. Société Nationale de Chemins de Fer Belges. Four motor generator sets for battery charging. (Ref. A. 11170.)*

East Lothians.—November 16th. County Council. Various works, including electric lighting in connection with housing schemes. Specifications, etc., from the county architect, Property and Works Department, Haddington.

Egypt.—CAIRO.—November 14th. Ministry of the Interior. H.p. and l.p. underground distribution system, including transformers and kiosks. for Mansourah. (A.X. 11136.)*
November 24th. Meters for Abou-Tig and Samannoud. (A.X. 11165.)*
December 22nd. Electric power station for the town of Fikria. (A.X. 11140.)*

Fife.—November 9th. County Council. Various works, including electric lighting, in connection with alterations at police stations. Specifications, etc., from Messrs. Walker & Pride, architects, Church Square, St. Andrews.

Hinderwell (YORKS.).—Erection of network and other equipment for the supply of electricity at Hinderwell, Runswick, Bay, and Staithes. Particulars from Mr. E. C. Lennox, Cleveland & Durham County Electric Power Co., Carliol House, Newcastle-upon-Tyne.

Hull.—Telephones Committee. Private automatic telephone switchboard. (See this issue.)

India.—NEW DELHI.—January 7th. Indian Stores Department. A.c. and d.c. ceiling fans. (A.X. 11116.)*
November 19th. A.c. and d.c. house service meters. (A.X. 11149.)*
January 26th. A.c. and d.c. table fans. (A.X. 11117.)

Iraq.—MOSUL.—December 7th. City Council. Complete town lighting plant. (See this issue.)

London.—OFFICE OF WORKS.—November 10th. Wire and cable. (October 30th.)
METROPOLITAN WATER BOARD.—November 24th. (a) Steam turbine with centrifugal pumps and electric generator, etc., for the Walton pumping station, and (b) three electrically-driven vertical centrifugal well pumps and one set of electrically-driven horizontal tandem centrifugal pumps, etc., for the Hampton pumping station. Particulars (deposit £2 2s. each section) from the chief engineer, 173, Rosebery Avenue, E.C.1.

Manchester.—November 16th. Electricity Committee. Steelwork for extension of coal crane gantry at Barton power station. Specification (£1 1s. deposit) from Mr. H. C. Lamb, chief engineer and manager, Electricity Department, Town Hall.
November 10th. Weldless steel lamp columns complete with fittings. Specification, etc., from Mr. H. C. Lamb, chief engineer and manager, Electricity Department, Town Hall.

New Zealand.—WELLINGTON.—December 7th. Post and Telegraph Department, 6,800 galvanised earth rods. (G.X. 10829.)*
December 1st. Public Works Department. Electrically-heated annealing furnaces for turbine buckets. (A. 11090.)*
February 2nd. Additional 11,000-V switchgear (A.X. 11163.)* and reactors (A.X. 11161)* for Lake Coleridge power scheme.
December 11th. Thames Valley Electric Power Board. Static condensers. (A.X. 11160.)*

Salford.—November 10th. Electricity Department. Substation fuseboards and transformer banks. (October 30th.)

South Africa.—JOHANNESBURG.—City Council. Cable. (A.X. 11145.)*
November 19th. Single- and three-phase oil-immersed transformers. (A.X. 11148.)* 40 miles of copper wire for overhead conductors. (A.X. 11154.)* Switchgear. (A.X. 11158.)*

Strood (KENT).—November 12th. Rural District Council. The following works at the Isolation Hospital, Whitehill Road, near Gravesend:—(a) underground mains; (b) oil-immersed transformer, and (c) complete lighting and power wiring, with pendants and fittings. Particulars from Mr. C. F. McInnes, 17, Harmer Street, Gravesend.

Wrexham.—November 17th. Electricity Department. Electric lighting installation at 14 houses. (See this issue.)

*Further particulars can be obtained at the Department of Overseas Trade (Inquiry Room), 35, Old Queen Street, S.W.1.

Contracts Closed

Australia.—SYDNEY (N.S.W.).—Municipal Council. Accepted. Switchhouse reconditioning, Pyrmont power station, parts and fittings for 5,000-V switchgear (£18,805).—Australian General Electrical Co., Ltd. —*Tenders.*

Birmingham.—Education Committee. Accepted. Electric lighting installation in schools.—Coley & Swinnerton, Ltd. (Summer Lane); Gordon Hughes Electrical Co., Ltd. (Islington); Baxter & Impey (Dolphin Lane and Church Road); Thomas Glover (Weoley Castle).
The Electricity Committee reports acceptance of the following tender during the past quarter:—Switchgear for Nechells station.—Ferguson, Pailin, Ltd.

Durham.—County Education Committee. Accepted. Installation of electric lighting in schools.—Sleigh & Wood (St. John's Chapel and Wolsingham); W. Sykes & Son (Wearhead and Westgate); T. B. Watson & Son (Fishburn and Sedgefield); Reid, Ferens & Co. (Lumley and Burnopfield).

Brentford and Chiswick.—Sewage Committee. Pumping plant and electrical equipment for sewage works:—

	£		£
J. Stone & Co., Ltd. ...	2,243	Pulsometer Engineering Co., Ltd.	1,940
Worthington - Simpson, Ltd.	2,230	E. N. Mackley & Co. ...	1,845
Mather & Platt, Ltd. ...	2,120	Harland Engineering Co., Ltd.	1,832
Gwynnes Pumps, Ltd. ...	2,078	Frank Pearn & Co., Ltd.	1,663
Tangyes, Ltd.	2,072	Mirrlees Watson Co., Ltd.	1,642
John Wolstenholme & Son, Ltd.	2,067	Hathorn Davey & Co., Ltd.	1,511
W. H. Allen, Sons & Co., Ltd.	2,060	Rees Roturbo Mfg. Co., Ltd.	1,415
Vickers-Armstrongs, Ltd., Barrow	1,995	Drysdale & Co., Ltd. ...	1,345
Harland & Wolff, Ltd., London	1,972		

The Committee has authorised the engineer to accept the most suitable tender.

Chesterfield.—Town Council. Accepted. 75-kVA transformer (£145).—Brush Electrical Engineering Co., Ltd.

Glasgow.—Education Committee. Recommended. Electric lighting installation at North Carntyne school (£321).—R. J. McIntyre. Electric lighting installation at Saracen school (£331).—D. A. McLarty & Co.
Corporation. Accepted. Alterations to electric lighting in City Chamberlain's Department (£114).—A. Anderson, Ltd.

Hornsey.—Housing Committee. Recommended. Wiring further Council houses.—E. E. Wright & Co.

Liverpool.—The British Thomson-Houston Co., Ltd., has secured a contract from the Mersey Railway Co. for a part supply for one year of gasfilled lamps.

London.—Fulham Borough Council. The tender of Messrs. Kershaws (Electrical Engineers), Ltd., was accepted for the wiring of the staircases and yards of the Swan Brewery estate. at £447, as well as that for the tenements. We understand that the tender of Mr. G. Hill, mentioned in this section on October 23rd, was withdrawn.
L.C.C. Education Committee. Accepted. Electric lighting at Archbishop Temple's school, Lambeth (£227).—T. Clarke and Co., Ltd. Electric lighting at Back Alley school, Bow (£289).—J. G. Sneath, Ltd. Electric lighting at Wilmot Street school, Bethnal Green (£399).—C. R. Price.
L.C.C. Central Public Health Committee. Wiring, etc., for electric lighting, heating and power, etc., at St. James' Hospital, Balham:—

	£		£
H. A. Neale & Co. (accepted)	3,735	Alpha Manufacturing & Electrical Co., Ltd. ...	4,433
J. Holbrook & Tattersall, Ltd.	3,794	Corts, Ltd.	4,566
G. E. Taylor & Co. ...	4,152	J. Briggs, Electrical Contractors, Ltd.	5,250
Building & Colliery Supply Co., Ltd.	4,253	L. G. Tate & Co., Ltd. ...	5,355
Electrical Installations, Ltd.	4,353	W. T. Canning & Co.	5,594
		Power & Lighting Installations Co.	5,905
		"Rhymos"	6,560

Stores and Contracts Committee. Accepted. Electrical fittings from August 1st last to July 31st, 1932.—British Central Electrical Co., Ltd.; Edison Swan Electric Co., Ltd.; Falk, Stadelmann & Co., Ltd.; General Electric Co., Ltd.; Samuel Heath & Sons, Ltd.; William McGeoch & Co., Ltd.; Julius Sax & Co., Ltd.; Siemens Electric Lamps & Supplies, Ltd.; Sloan Electrical Co., Ltd.; Sperryn & Co.

Manchester.—Education Committee. Accepted. Electrical installation at new recreation room, Styal Cottage Homes.—R. H. Clampett & Co.
Public Health Committee. Accepted. Electric cable for the Withington Hospital and Institution.—Connolly's (Blackley), Ltd.
Water Committee. Accepted. Electrically-driven centrifugal pumps, etc., Lostock booster station.—Mather & Platt, Ltd.

Shipley.—Electricity Committee. Accepted. Cable.—Pirelli-General Cable Works, Ltd.

Warrington.—Electricity Committee. Accepted. Cables.—British Insulated Cables, Ltd.
Housing Committee. Accepted. Installation work: 20 houses at Westy estate.—Clough and Gaskell, Ltd. 183 houses at Loushers estate.—D. Cooper.

Forthcoming Events

Institution of Electrical Engineers (*Meter and Instrument Section*).—Friday, November 6th. Institution, London. 7 p.m. Chairman's address. Mr. F. C. Knowles. (*North-Eastern Students' Section*).—Friday, November 6th. Armstrong College, Newcastle-upon-Tyne. 7.15 p.m. "Four Months in the United States." Mr. G. D. Clothier. Institution, London. Monday, November 9th. 7 p.m. Informal meeting. Discussion on "Lighting Protection especially in Tropical Countries." Opened by Mr. J. F. Shipley. (*North-Eastern Centre*).—Monday, November 9th. Armstrong College, Newcastle-upon-Tyne. 7 p.m. "The Electrical Heating of Buildings." Mr. R. Grierson. (*Western Centre*).—Monday, November 9th. Technical College, Gloucester. 6 p.m. "The Design of a Distribution System in a Rural Area." Messrs. E. W. Dickinson and H. W. Grimmitt. (*North-Midland Centre*).—Tuesday, November 10th. Hotel Metropole, Leeds. 7 p.m. "The Electrical Heating of Buildings." Mr. R. Grierson. (*North-Western Centre*).—Tuesday, November 10th. Engineers' Club, Manchester. 7 p.m. "Recent Progress in Large Transformers." Mr. R. M. Charley. "The Application of the Induction Voltage Regulator." Mr. W. E. M. Ayres. (*Scottish Centre*).—Tuesday, November 10th. Institution of Engineers and Shipbuilders in Scotland, Glasgow. 7.30 p.m. "The Design of a Distribution System in a Rural

Area." Messrs. E. W. Dickinson and H. W. Grimmitt. (*Hampshire Sub-Centre*).—Wednesday, November 11th. University College, Southampton. 7.30 p.m. "Recent Progress in Large Transformers." Mr. R. M. Charley. (*Dundee Sub-Centre*).—Thursday, November 12th. University College, Dundee. 7.30 p.m. "The Receiving Station at Cupar for Transatlantic Telephony." Mr. J. E. Luckhurst. (*London Students' Section*).—Friday, November 13th. Institution, London. 6.15 p.m. "Short-Wave Transmission." Mr. W. R. Bishop.

Institution of Mechanical Engineers.—Friday, November 6th. Institution, London. 6 p.m. "The Mechanical Aspects of Electricity." Mr. Ll. B. Atkinson.

Leeds Electrical Club.—Friday, November 6th. Hotel Metropole, Leeds. Dinner-dance.

Institute of Metals (Scottish Branch).—Monday, November 9th. Institution of Engineers and Shipbuilders in Scotland, Glasgow. 7.30 p.m. "Experiences with some Electric Furnaces for Melting Copper and Copper Alloys." Mr. W. L. Govier.

Association of Mining Electrical Engineers (Scottish Branch).—Wednesday, November 11th. Reid's Tearooms, Glasgow. Discussion on "Pit Lighting." (*South Wales Branch*).—Saturday, November 14th. Cardiff. Continuation of discussion on Mr. J. Jones's paper, "Fault Protection."

British Electrical Development Association (Northern Counties Area).—Thursday, November 12th. Messrs. Sopwith's Lounge, Newcastle-upon-Tyne. 7.15 p.m. "Modern Lighting." Mr. A. B. Read.

Junior Institution of Engineers.—Friday, November 13th. Institution, London. 7.30 p.m. Annual meeting.

Our Service Department

Inquiries must be accompanied by a stamped addressed envelope.

We shall be glad to learn the names and addresses of the makers of the following:—

VIOLA ultra-violet ray set.

SYLVIA shades.

Notes

The Factory Report

The annual report of the Chief Inspector of Factories, which was reviewed in our issue of August 21st (p. 286), contained a section by the Senior Electrical Inspector dealing with electricity and electrical accidents. The salient features have been reprinted as a separate pamphlet in the hope that it may be purchased by employers for their electrical staff, foremen, and other employés engaged on electrical work, who may thus be made acquainted with the circumstances which have led to accidents, and thereby be enabled to avoid or prevent similar accidents in connection with their own work.

The "Monarch of Bermuda"

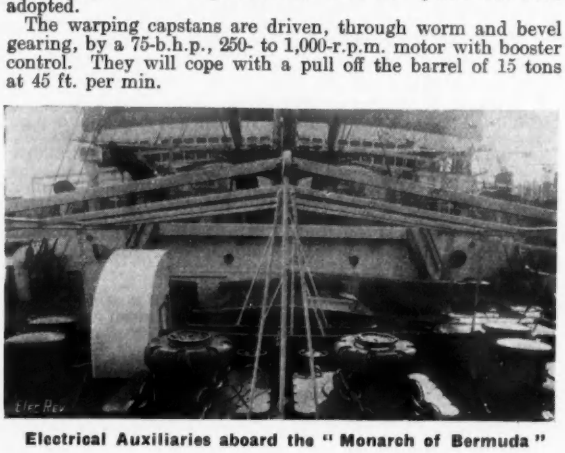
The *Monarch of Bermuda*, whose sea trials have been arranged for this week, is a turbo-electric ship built by Messrs. Vickers Armstrongs, Ltd., for the New York-Bermuda service of Messrs. Furness Withy & Co., Ltd.

The electrically-driven auxiliaries, as in the case of the *Rangatira*, the last large turbo-electric liner to be completed, have been manufactured by Messrs. Clarke, Chapman and Co., Ltd. These auxiliaries include four self-contained cargo winches, cable and warping capstan gear for handling the anchor, and three warping capstans.

The winches are arranged in pairs. Each winch is driven through worm-gearing by a 24 b.h.p. motor and has a duty of three tons at 130 ft. per min.; the light-hook speed is 400 ft. per min. The main barrel is 24 in. by 16 in. The control gear is of the contactor type. A pair of winches will deal with a maximum load of 15 tons at 30 ft. per min.

The anchor-handling capstans illustrated are driven through worm and bevel gears by a 150-b.h.p., 400- to 900-r.p.m. motor. The capstan will exert a pull on one cable holder of 28½ tons at 38 ft. per min. A patent booster-control system has been adopted.

The warping capstans are driven, through worm and bevel gearing, by a 75-b.h.p., 250- to 1,000-r.p.m. motor with booster control. They will cope with a pull off the barrel of 15 tons at 45 ft. per min.



Electrical Auxiliaries aboard the "Monarch of Bermuda"

Radio Dealers at Law

On October 28th, in the King's Bench Division, Mr. Ju Rowlatt heard an action by the Electric Lamp Service ., Ltd., against V. Zeitlin & Sons, Ltd.

Mr. C. W. Lilley, for defendants, said that there had never been any dispute on the original claim for damages for breach of contract, and no defence was entered at the trial. The present proceedings were confined to a counter-claim. Plaintiffs and defendants were regular buyers of valves and other radio accessories from Radio Clearance Co., Manchester, who sold valves in composite parcels to different shops. In August, 1930, plaintiffs applied to defendants for the loan of certain types of valves, pending the receipt of such valves by plaintiffs from the Radio Clearance Co. Defendants supplied to plaintiffs 1,182 valves of certain types. In September, 1930, plaintiffs informed defendants that they would be unable to return to the defendants the valves, and it was agreed that plaintiffs should pay for and keep the goods, also that plaintiffs should take from the defendants at cost price a due proportion of valves of other types as contained in the parcels supplied by the Clearance Co. The cost price of the valves supplied by the Clearance Co. was £380 18s. 5d., and the selling price in the absence of the more valuable types of which plaintiffs had already taken delivery was only £100.

Defendants' case was that plaintiffs had picked the best valves out of their composite parcel, and left those what were not readily saleable.

Mr. C. Collingwood, for plaintiffs, contended that they were under no obligation to take any more. They had taken and paid for that which was subject to the contract.

His Lordship, giving judgment, said that he was perplexed by the contrary evidence given by both sides. There would be judgment for plaintiffs on the counter-claim, with costs, and the stay of judgment on the claim would be removed.

On October 29th, in the King's Bench Division, Mr. Justice Macnaghton had before him an action by Mr. Philip Kay, Clapton Common, against the British Electrical Manufacturing Co., Hendon, to recover damages for alleged breach of contract, which the plaintiff put at £132 14s. The breach of contract consisted in a refusal to deliver a number of loud speakers and also some crystal boxes which plaintiff said he had purchased from defendants. The defence was a denial of any agreement having been made for the sale of the loud speakers.

His Lordship, after hearing the evidence, found in favour of the plaintiff, and awarded him £105 and costs.

Automatic Train Control

Tests have recently been carried out on the Southern Railway of the Strowger-Hudd automatic train-control system, according to the *Manchester Guardian Commercial*. The equipment consists of a receiver, composed of four collector plates carried by the engine, and track inductors. Each collector plate supports a pole piece, between which is pivoted an armature carrying a spring blade which covers a pilot valve in the hose connection of the train control valve. This valve when released operates a hooter in the cab and also passes air into the train pipe and applies the brakes.

The track inductors are a combination of permanent and electro-magnets which function only when the signal is at "danger."

The Royal Society of Arts

The 1931-32 session of this Society opened on November 4th with an inaugural address by Sir Edward Gait, chairman of the Council of the Society. Papers of electrical interest to be read during the session are:—November 25th: "An Investigation throwing new light upon Duplex Therapy and other Electro-Medical Applications," by Mr. G. G. Blake. December 2nd: "Lighthouses," by Mr. D. Alan Stevenson. A special meeting is to be held on November 17th, when a paper by Messrs. M. Hochstadter, W. Vogel and E. Bowden on "The Pressure Cable—an Advance in the Construction of High Voltage Cable Installations" will be read. On November 23rd and 30th, and December 7th, Mr. H. R. Ricardo will give three lectures on "Diesel Engines," and on March 7th, 14th and 21st, Mr. A. E. L. Chorlton will deliver three lectures on "Oil Engine Traction."

Electricity and Aviation

In a lecture delivered to the E.A.W. at the E.L.M.A. Lighting Service Bureau, London, Mrs. Pender Chalmers gave an account of her three-weeks aerial tour of Bagdad, Babylon, and Ur. Mrs. Chalmers said that without electricity aviation would be impossible, and mentioned the part played by electricity in the night lighting of aerodromes. After the lecture a demonstration was given by the Downing Radiant Heat Co. of an airman's electrically heated coat and gloves.

Rural Overhead Lines

We are informed that the two rural overhead lines of the South Somerset and District Electricity Co., Ltd., illustrated on pages 576-7 of our October 16th issue, were erected to the specification of Messrs. G. V. Twiss & Partners, consulting engineers.

Our Personal Column

Electrical men are invited to enable us to keep readers of the "Electrical Review" posted concerning their movements

THE NEW PARLIAMENT.—The following gentlemen who are connected in one way or another with the electrical industry were returned at the General Election :—

Sir G. Hume (Greenwich), who is a member of the Institution of Electrical Engineers, was chairman of the London Electricity Committee from 1913 to 1926, and a member of the London and Home Counties Joint Electricity Authority in 1925-6.

Mr. D. Hanley (Deptford) is an electrical engineer.

Sir K. Vaughan Morgan (Fulham East) is a director and vice-chairman of the Morgan Crucible Co., Ltd.

Sir Basil Peto (Barnstaple) is also a director of the Morgan Crucible Co., Ltd.

Mr. G. Balfour (Hampstead) is the founder and head of Messrs. Balfour, Beatty & Co., and chairman of the Power Securities Corporation, Ltd.

Sir Philip Dawson (Lewisham West), consulting engineer, is a well-known authority on railway electrification. He has been a member of the Electrification of Railways Advisory Committee and has also served on the Water Power Resources Committee of the Board of Trade.

Major H. A. Procter (Accrington) has studied pulverised coal firing and his inventions are extensively used abroad.

Sir Walter Preston (Cheltenham) is the chairman of Platt Bros. & Co., Ltd., and is also a director of J. Stone & Co., Ltd.

Sir George Hamilton (Ilford) served his apprenticeship as electrical engineer with Messrs. Scott & Mountain and afterwards represented that company in India, Egypt, Russia and other countries.

Sir J. Nall (Manchester, Hulme) is a director of the Midland Counties Electric Supply Co., Ltd., and is connected with a number of transport undertakings. He was president of the Institute of Transport in 1925-26.

Mr. A. E. L. Chorlton (Manchester, Platting), consulting engineer, is principally concerned with internal combustion and general engines, and has been connected with William Beardmore & Co.

Sir Newton Moore (Richmond), before coming to England was Prime Minister of Western Australia. He is a civil engineer and surveyor, and a director of the General Electric Co., Ltd.

Mr. P. J. Pybus (Harwich) was appointed Minister of Transport in the National Government, and is well known by reason of his connection with the English Electric Co., Ltd.

Sir Edward Hilton Young (Sevenoaks), the secretary to the Department of Overseas Trade in the National Government, is also a director of the English Electric Co., Ltd.

Sir John Ferguson (Twickenham) is the chairman of the India Rubber, Gutta Percha and Telegraph Works Co., Ltd.

Mr. P. J. Hannon (Birmingham, Moseley) is a director of the Westminster Electric Supply Corporation, Ltd.

Lt.-Col. Sir Frederick Hall (Dulwich) is on the board of the County of London Electric Supply Co., Ltd.

Sir Douglas Newton (Cambridge) is also connected with the electricity supply industries, being a director of Edmundson's Electricity Corporation, Ltd., and the Shropshire, Worcestershire and Staffordshire Electric Power Co.

The Metropolitan-Vickers Electrical Co., Ltd., has made the following appointments :—Chairman, **Sir Felix J. C. Pole;** deputy-chairman, **Mr. W. C. Lusk;** and sales director, **Mr. P. S. Turner. Mr. H. C. Pierson,** manager of home sales, has been elected to the board.

Dr. Fritz Schroter, director of the Research Department of the Telefunken Gesellschaft, has been awarded the degree of honorary professor by the Technical High School of Berlin in appreciation of his work in connection with picture telegraphy.

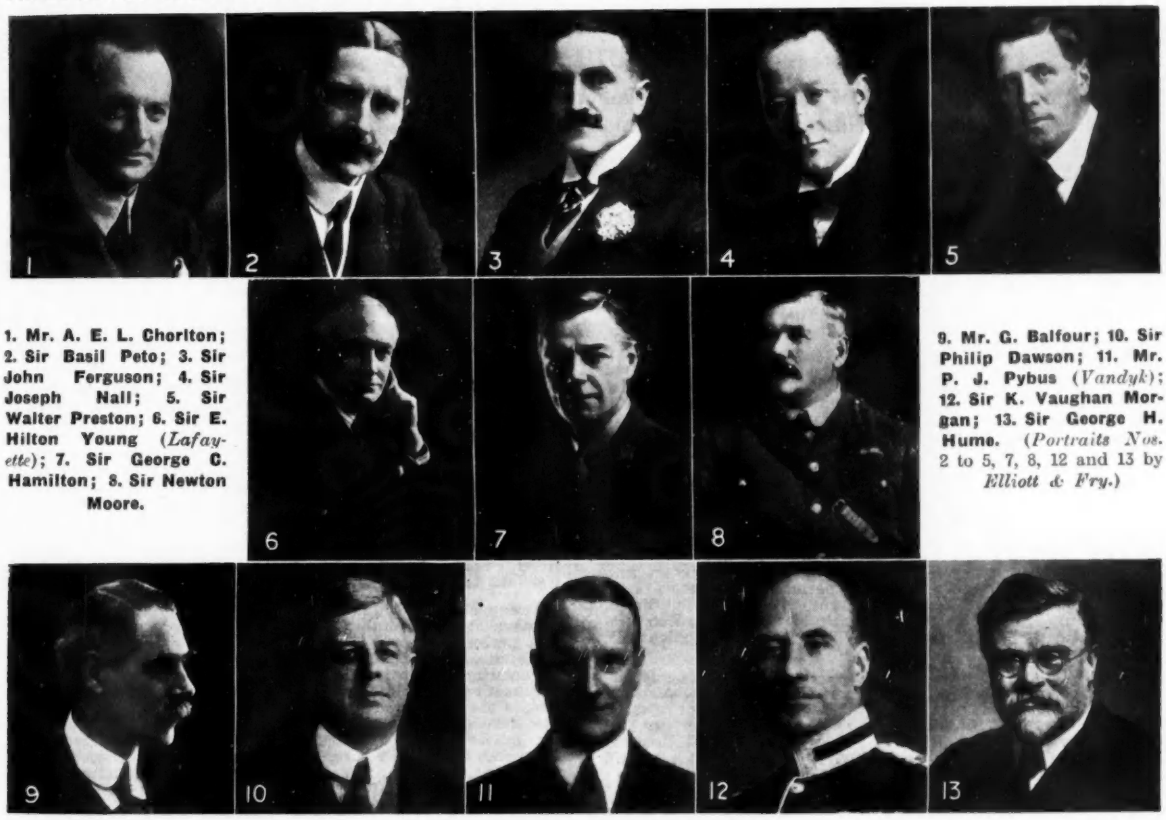
Mr. David Smith is leaving the position of manager of the machine tool and small tool department of Messrs. T. C. Jones and Co., Ltd., in order to start on his own account as a manufacturers' agent. He has superintended the carrying out of the equipment work for a number of factories including some well-known electrical ones. His address is 84, Temple Fortune Lane, Golders Green, N.W.11.

Mr. C. L. E. Stewart, formerly electrical engineer and tramways manager for the Rawtenstall Corporation, has been appointed consulting engineer to the Barnoldswick Electricity Department.

Mr. J. N. L. Anderson, who for the past 20 years has been connected with Arbroath Electric Light and Power Co., has been appointed district manager of the North Angus area of the Grampian Electricity Supply Co., which includes the supplies for Forfar and Kirriemuir, together with the managership of the North of Scotland Electric Light and Power Co., operating in Montrose and Brechin. Mr. Anderson's appointment also includes the managership of the Duncan Electric Supply Co.'s stations at Ballater, Kintore, and Ellon. He will have his headquarters at Montrose, and has lately been assisting with the development of the South Angus area of the Grampian electricity scheme.

Mr. Stanley Hainsworth, of the staff of Crompton Parkinson, Ltd., has been presented by his colleagues with a case of stainless cutlery on the occasion of his marriage.

Mr. W. G. Graham has left the service of the Eastern Electric Installation Co., Ltd., of Chelmsford.



1. Mr. A. E. L. Chorlton; 2. Sir Basil Peto; 3. Sir John Ferguson; 4. Sir Joseph Nall; 5. Sir Walter Preston; 6. Sir E. Hilton Young (*Lafayette*)**; 7. Sir George C. Hamilton; 8. Sir Newton Moore.**

9. Mr. G. Balfour; 10. Sir Philip Dawson; 11. Mr. P. J. Pybus (*Vandyk*)**; 12. Sir K. Vaughan Morgan; 13. Sir George H. Hume.** (*Portraits Nos.* 2 to 5, 7, 8, 12 and 13 by *Elliott & Fry.*)

Members of the New Parliament

Mr. S. B. Langlands, who has attained his semi-jubilee as inspector of street lighting in Glasgow has been presented by the staff with silver bowls.

Dr. H. Kennedy, Dr. H. C. Foley and Mr. P. J. Egan, the part-time members of the Irish Free State Electricity Supply Board, are due to retire this month, and it is stated that the Government intends to introduce important changes in the management system of the Shannon Scheme.

Mr. L. Jessop, of Messrs. Jessop & Boydell, and **Mr. D. Pearson**, illuminating engineer, have been elected to the Bradford City Council.

Mr. F. H. H. Bellamy, until recently sales engineer with the Hotpoint Electric Appliance Co., Ltd., has been appointed sales engineer with the Jackson Electric Stove Co., Ltd.

Mr. A. Leggett has been appointed a director and chairman of Messrs. E. R. & F. Turner, Ltd., Ipswich, in succession to the late Mr. Pierson Turner.

Mr. F. W. Lawton has been appointed chief assistant engineer to the Birmingham Corporation electricity undertaking.

Mr. C. R. D. Pritchett, a managing director of Pritchett and Gold and E.P.S. Co., Ltd., has been appointed chairman of the National Accumulator Co., Ltd., and of the Tudor Accumulator Co., Ltd., following the death of the late chairman, Mr. Bernard M. Drake.

Mr. H. A. Curtis has been presented with an oak sideboard by his colleagues on the staff of the Shoreditch Electricity Department on his marriage.

Obituary

Mr. J. Dobson.—The death occurred on October 25th, at the age of 58 years, of Mr. Jonas Dobson, for 29 years rolling stock superintendent of the Southend-on-Sea Corporation Tramways Dept.

Mr. Maurice Eilenberg.—The death is reported of Mr. Maurice Eilenberg at sea, while returning to South Africa after a health trip overseas. He was a director of the Cape Electric Tramways Co. and of the Cape Town Tramways Co.

Mr. Gregory Walker.—The death occurred on October 30th of Mr. Gregory Walker, assistant mains inspector to the Blackburn Corporation Electricity Department. Mr. Walker, who was sixty years of age, had been in the service of the Corporation for thirty-five years.

Financial Section

New Companies, Returns of Share Capital, Debenture Charges, Reports of Electrical Companies, Dividend Changes, Transactions in Stocks and Shares

New Companies Registered

Watson & Henderson, Ltd.—Private company. Registered October 30th. Capital, £5,000 in £1 shares. Objects: To acquire the business of dry battery manufacturers carried on by C. E. Watson and F. G. Henderson at 2, Fore Street, Hexham, as "Watson & Henderson." The permanent directors are: H. Lees, 8, Elvaston Road, Hexham, gas engineer (chairman), C. E. Watson, Westwynds, Wall, Northumberland, and F. G. Henderson, 2, Fore Street, Hexham. The last two named are joint managing directors. Solicitors: J. H. & G. Nicholson, Hexham.

Pamphonic Holdings, Ltd.—Private company. Registered October 30th. Capital, £500 in £1 shares. Objects: To acquire the right to use information relating to electrical and mechanical apparatus for the reproduction of sound, and to carry on business as electrical and mechanical engineers, etc. The directors are: P. H. Taylor, 36, Albert Road, Regent's Park, N.W.8, and E. Lavington, 26, Holmwood Gardens, Streatham. Solicitors: Kimbers Williams & Co., 79, Lombard Street, E.C.2.

Singaphones, Ltd.—Private company. Registered October 28th. Capital, £1,000 in £1 shares. Objects: To carry on the business of manufacturers of and dealers in apparatus and supplies connected with wireless telegraphy, television and telephony, gramophones, etc. The permanent directors are: Arjan Singh, 12, Lowther Road, Barnes, S.W.13; Kartar Singh, 33, Salisbury Road, Harrow; and Purshottam N. Rao, 89, Aylward Road, South Merton, S.W.20. Registered office: 33, Salisbury Road, Harrow.

Ultima Radio & Television, Ltd.—Private company. Registered October 26th. Capital, £500 in £1 shares. Objects: To carry on the business of manufacturers of and dealers in radio receiving apparatus for sound and television, gramophones and musical instruments of all kinds, etc. The permanent directors are: R. D. Carter, 19, Windsor Drive, Timperley, Ches, and S. Hatton, Chester Road, Poynton, Ches. Registered office: 14, Brown Street, Manchester.

Cunningham Beard & Co., Ltd.—Private company. Registered October 28th. Capital, £100 in £1 shares. Objects: To acquire the business hitherto carried on by F. G. Cunningham at 6, St. Mary Abbot's Terrace, Kensington, W.14, and to carry on the business of manufacturers, importers and exporters of and dealers in wireless apparatus, components and accessories, electric lighting and heating fittings, gramophones and accessories, etc. The subscribers are: A. J. Cunningham, 6, St. Mary Abbot's Terrace, Kensington, W.14, and Mrs. M. O. Cunningham, 12, Clarendon Court, N.W.2. A. J. Cunningham is the first director. Solicitors: Bulcraig & Davis, Amberley House, Norfolk Street, W.C.2.

Economic Radio, Ltd.—Private company. Registered October 31st. Capital, £1,000 in £1 shares. Objects: To carry on the business of providing, maintaining and working stations for the reception, relaying and publishing of wireless programmes, television, etc. The directors are: R. W. Rome, 103, Burges Road, Thorpe Bay, Essex, and T. Clatworthy, 191, Queen Street, South Elmsall, Yorks. Registered office: 191, Queen Street, South Elmsall, Yorks.

Wilts Wholesale Electrical Co., Ltd.—Private company. Registered October 31st. Capital, £2,000 in £1 shares. Objects: To acquire the business of wholesale dealers in electrical, mechanical and wireless installations, etc., now carried on by J. S. James and A. H. James at Home Mills, Trowbridge, Wilts, as "The Wilts Wholesale Electrical Co." The directors are: J. S. James (permanent director and chairman), 57, Fronie Road, Trowbridge, Ella E. James, and Marjorie M. Shewring, addresses not stated. Solicitors: W. Norman Roberts, 39, Park Square, Leeds.

W. J. Matthews & Co., Ltd.—Private company. Registered November 2nd. Capital, £500 in £1 shares. Objects: To carry on the business of manufacturers and repairers of and dealers in electrical or mechanical equipment, apparatus for wireless telegraphy, telephony or television, etc. The subscribers are: E. Macartney, 2, Eldon Square, Newcastle-on-Tyne, and J. W. Matthews, Olive House, 16, Burnfoot Lane, Whitley Bay. E. Macartney signs document as director. Secretary: E. Macartney. Solicitor: A. W. Rhodes, 1, New Square, Lincoln's Inn, W.C.2.

Insulation & Ducting, Ltd.—Private company. Registered November 2nd. Capital, £500 in £1 shares. Objects: To carry on the business of manufacturers of and dealers in heating, ventilating and electrical plant and apparatus, etc. The first directors are: W. Lonsdale and Mrs. E. E. Lonsdale, both of 71, Tulsemere Road, West Norwood, S.E.27. Secretary: Mrs. E. E. Lonsdale. Registered office: 113, Wandsworth Road, S.W.8.

W. A. Gooding & Sons, Ltd.—Private company. Registered November 2nd. Capital, £6,000 in £1 shares (1,000 6 per cent. cumulative preference and 5,000 ordinary). Objects: To acquire the business of sheet metal workers and electrical engineers and contractors, carried on by W. A. Gooding, W. A. Gooding, Junr., and H. Gooding, at 43-44, Upper Russell Street, Brighton, and at The Green, Southwick, Sussex, as "W. A. Gooding & Sons." The permanent directors are: W. A. Gooding, Victoria Villa, Victoria Road, Southwick, Sussex (governing director), W. A. Gooding, Junr., Hazelwood, 34, The Green, Southwick, Sussex, and H. Gooding, 34, Vale Road, Portslade, Sussex. Solicitors: Colbourne, Bush & Bartlett, 62, Old Steine, Brighton.

James Bros. (Wiltshire), Ltd.—Private company. Registered October 31st. Capital, £6,000 in 2,000 6 per cent. cumulative first preference, 1,000 25 per cent. (free of income tax) second preference, and 3,000 ordinary shares of £1 each. Objects: To acquire the business of electrical, mechanical and wireless engineers and dealers now carried on by J. S. James and A. H. James at The Parade, Trowbridge, Wilts, as "James Bros." The directors are: A. H. James (permanent director and chairman), Westlands, Hilperton, Trowbridge, C. J. Moore, 13, Maryport Street, Devizes, Wilts, and B. W. James, address not stated. Solicitor: W. N. Roberts, 39, Park Square, Leeds.

Returns of Electrical Companies

D.P. Battery Co., Ltd.—Capital, £100,000 in £1 shares. Return dated April 1st, 1931. All shares taken up. £28,000 paid. £72,000 considered as paid. Mortgages and charges, nil.

Western Electric Co., Ltd.—Capital, £20,000 in £1 shares. Return dated September 8th, 1931. All shares taken up. £20,000 paid. Mortgages and charges, nil.

Hastings and District Electric Tramways Co., Ltd.—Capital, £372,942 10s. in 130,000 preference shares of £1 and 485,885 ordinary shares of 10s. Return dated June 23rd, 1931. 80,000 preference and 268,235 ordinary shares taken up. £200,000 paid on the preference and 240,000 ordinary shares. £14,117 10s. considered as paid on 28,235 ordinary shares. Mortgages and charges: £130,000 7 per cent. redeemable secured notes, and £450,000 5 per cent. debenture stock.

Cornwall Power Co., Ltd.—Capital, £400,000 in 150,000 preference and 250,000 ordinary shares of £1 each. Return dated May 7th, 1931. All shares taken up. £190,007 paid on 150,000 preference and 40,007 ordinary shares. £209,993 considered as paid on 209,993 ordinary shares. Mortgages and charges, nil.

Burke & Co., Ltd.—Particulars filed of £1,000 debentures authorised October 1st, 1931, charged on the company's undertaking and property, present and future, including uncalled capital, the amount of the present issue being £100.

W. L. Gray, Ltd.—G. Dickinson, of 82, Victoria Street, S.W.1, was appointed receiver and manager on October 17th, under powers contained in debenture dated February 22nd, 1927.

Jackson Bros. (Sheffield), Ltd.—A. J. Platt, of Mazda Buildings, Campo Lane, Sheffield, was appointed receiver on October 24th, under powers contained in debenture dated November 28th, 1919.

City Notes

Drake & Gorham, Ltd., held their annual meeting on October 30th, Mr. Hamlyn Drake (chairman and one of the managing directors) presiding. Before reviewing the past year's operations Mr. Drake referred to the death of his father, Mr. Bernard Drake, the founder of the company, and said that the present position of the business was largely due to the ability with which his father directed its energies for forty-five years.

He then said that in spite of the world trade depression the results were nearly equal to those of last year. Orders were not easy to obtain at the moment, but the business had so many ramifications that they were hopeful of maintaining satisfactory results during the coming year, provided that the present national difficulties could be overcome and confidence restored. The talk of protective tariffs had induced foreign manufacturers to consider seriously the necessity for building factories in this country, and if tariffs were finally introduced, a large field should be opened up to absorb the energies of their Installation Department. The department dealing with London installation work showed a further increase in turnover and profit compared with last year, and an interesting development was the increasing demand for large private generating plants in this area. They had secured the contract for a temporary or auxiliary generating plant at the Bank of England, which consisted of four 400 b.h.p. crude oil engines direct coupled to 300-kW generators. It was to be used for the supply of power and lighting until the building was sufficiently advanced to allow the main generating plant to be installed, when it would probably be used as a standby. They had been able to employ a much larger staff on the wiring installation of the bank during the past year, and it was expected that the section on which they were now working would be completed in 1932.

They had also received the order for renewing the generating plant at the Prudential Assurance Co.'s head office in Holborn. The old plant now in use was originally designed by the late chairman and Mr. Gorham in 1885 and completed and improved in 1890. The new equipment would be on the same lines as that in the Bank of England, and in addition would include a storage battery. Other contracts included the electrical work in connection with South Africa House, and they had recently completed the electrical installation for a new building in Exeter for the University College of Exeter and the South West.

The returns of the country house lighting and heating section continued to be satisfactory. In some districts the spread of the public mains had resulted in many orders for domestic installations and in more remote parts of the country there was still a good demand for private installations. Even where a public supply was available, it had been found in several cases that it was more economical to install a private plant with a modern crude oil engine. The Manchester branch had been able to show better results. The sales of electric signs for advertisement and decorative purposes, for which they held sole agencies, were on the upward grade, and large contracts had been obtained.

The new works for the manufacture of switchgear were nearly full and the question of exercising the option on the adjoining land with a view to future extensions would shortly have to be considered. During the past year much time and thought had been devoted to the development of new lines and they now had a comprehensive range of h.p. switchgear. These developments had opened up new fields and they were taking particular notice of the requirements of the Dominions with a view to developing their export business.

The loss incurred as a result of the Duro agency was due to the fact that the Duro Co. of America did not carry out the agreement which was made by their president as to the termination of the agency. They had taken up the sole selling agency for an all-British water softener which could be supplied either for hand operation or of the semi-automatic type.

The question of finance, referred to in last year's report, had been settled by issuing £60,000 5½ per cent. debentures at 95. This had enabled the financial arrangements made in connection with the new works to be put on a more satisfactory basis, and had provided floating capital for the extended interests of the company. Of the six per cent. notes, £4,350 was now outstanding, £2,860 having been converted into the 5½ per cent. debentures and £400 paid off. The report and accounts were adopted.

Grosvenor Electric Batteries, Ltd., in its first report, for the period from September 30th, 1929, to June 30th last, states that the net profit from September 30th, 1929, to the date of incorporation (May 29th, 1930), was £3,152. This is applied to writing off the whole of the preliminary expenses (£2,583) and in writing down goodwill (£569). The profit from incorporation to June 30th last was £2,843, and, after paying the preference dividend, a balance of £1,897 is carried forward. The report states that since incorporation £20,000 has been spent on plant, machinery, land and buildings, but the current accounts do not reflect the benefit of this expenditure. At the present time the factory is working to its full capacity, and extensions and additions are being made to cope with increased business. Meeting: November 6th.

The United River Plate Telephone Co. reports a revenue for 1930 of £2,959,497, as compared with £3,011,936 in 1929, and a profit of £545,358 (against £458,636). It is proposed to pay a final ordinary dividend of 5 per cent., making 8 per cent. for the year (same) and to carry forward £127,689 (£168,231). During the year 304,000 ordinary £5 shares were issued and the proceeds (£1,520,000) were used to liquidate in part the company's indebtedness to the International Telephone and Telegraph Corporation. The management of the company was transferred to New York in April last.

Marco Refrigerators (1929), Ltd., in its report for the year ended September 30th, shows a net loss of £5,180, as against a loss of £7,135 in the previous year, increasing the debit balance to £12,316. The report states that there has been a considerable increase in sales and future trading is expected to benefit from extensions made during the year.

Amalgamated Wireless (Australasia), Ltd., has declared a half-yearly dividend at the rate of six per cent. per annum, making, with the interim dividend, 6 per cent. for the year.

The Western Electricity Supply Co., Ltd., reports a net profit for the year ended June 30th of £69,894, as compared with £52,883 in the preceding year, to which is added £3,330 brought in. Reserve receives £20,000 (£15,000), and the final ordinary dividend is 7 per cent., making 10 per cent. for the year (same), plus a bonus of 5 per cent. (10 per cent.). The amount carried forward is £9,724.

Ruths Steam Storage, Ltd., made an application for confirmation of a reduction of capital before Mr. Justice Eve in the Chancery Division on November 2nd. Mr. H. S. G. Buckmaster said the loss was attributable to world-wide causes. It was proposed to effect the reduction by cancelling 10s. of each £1 share. The net trading loss was £91,052. The reduction was confirmed.

The International Hydro-Electric System is assuming that for the dividend payable October 15th, class "A" shareholders will prefer the cash option of 50 cents per share instead of payment in stock at the rate of one-fiftieth of a share.

John I. Thornycroft & Co. propose to pay the full preference dividend for the year ended July 31st and to carry forward the balance of £52,108. No dividend will be paid on the preferred ordinary shares (against 9 per cent.), or on the ordinary shares (13 per cent. last year).

W. T. Henley's Telegraph Works Co., Ltd., has declared an interim dividend on the ordinary shares of 1s. 6d. per share, less income tax (same).

The City of Buenos Ayres Tramways (1904), Ltd., has announced a dividend of 1¼ per cent. for the quarter ended September 30th (same).

The Electrical Distribution of Yorkshire, Ltd., reminds subscribers for the 100,000 shares issued in March that the final instalment of 5s. per share is due on November 9th.

Haslam & Newton, Ltd., announce that they are unable to recommend payment of the dividend on the preference shares, due on November 1st.

Parsons' Foreign Patents Co., Ltd., has declared an ordinary dividend of 1s. 3d. per share, less tax, for the year ended June 30th (against 2s. last year).

Companies Struck Off the Register

The following companies have been struck off the Register and are thereby dissolved:—

Insulating Supplies, Ltd.
National Electric Lamp Co., Ltd.
Wax Electric Light Tube Manufacturing Co., Ltd.

Stocks and Shares

TUESDAY EVENING.

THE effect of the General Election was to bring about a half-hour's rise in the Stock Exchange, where great excitement prevailed, and undue inflation occurred in the prices of most securities. The financial exuberance lasted for a time all too short to save keen disappointment on the part of those who had bought in the hope that the published results would continue the advance previously begun. Stocks and shares of all kinds were affected. British Government securities have gone back noticeably, but this is due, more than any other cause, to the decline in the value of sterling. A bright exception to the reaction is provided by rises in Underground Railway stocks.

London Passenger Transport

The anticipation that under the new Government the London Passenger Transport Bill will fail to secure Parliamentary passage is responsible for improvements in the price of Metropolitan ordinary, Districts, and Underground Electric ordinary. The last-named have risen a florin to 21s. City and South London and London Electric ordinary are each 1 up at 6½. The market in the stocks is so narrow that any little demand serves to emphasise the scarcity of floating supply, and to bring about a sharp improvement in values. It was pointed out here that Metropolitans were standing not long ago at a price which, on the basis of the present-paid dividend, gave 10 per cent. on the money, though continuance of the dividend was not to be relied upon. Districts still yield a little over 8 per cent. on the money at the present time, and the dividend, so far as can be gauged at present, is not likely to be reduced to any extent from the last-paid 5 per cent. The notification that the London Electric does not intend to spend more money than is at present sanctioned upon the extension schemes in hand, made a further contribution to the strength shown by the stocks. The prices of the prior charge issues have remained about the same as they were.

Gilt-edged Securities

The weakness of sterling in relation to the value of the dollar and the franc has already been mentioned, and is put forward in justification of the theory that fixed-interest bearing stocks are liable to come down, while ordinary stocks and shares may be expected to improve. In actual fact, prices of all classes have declined during the past few business days, though this is due, not to any intrinsic considerations, but, so far as ordinary shares are concerned, to a good deal of selling on the part of weak holders. When once this is disposed of, the natural economic position will assert its influence. A great deal has been made in the Stock Exchange, and amongst investors, of the possibility of tariffs being imposed on manufactured goods. For some time to come there are likely to be erratic movements in prices of shares in those companies whose business will be affected by such political action as the term "safeguarding" covers.

The heavy tendency shown by the stocks and shares of the electricity authorities is due to an apprehension that the value of the £ may still further weaken. The companies' debenture stocks are, however, a good market. Rises are shown by County of London debenture at 99, Edmundsons' debenture at 98, London Power debenture at 99¼, and North Metropolitan Power second debenture at 95½.

Cables and Wireless

After a violent upward spurt in the prices of Cables and Wireless stock on the result of the General Election, more moderate counsels prevailed, and the greater part of the improvement was lost. On balance, the changes are comparatively small. Recognition is accorded to the argument advanced here last week that there would appear to be little chance of the "A" ordinary stock receiving any dividend next March. Nor can it be considered by any means certain that the 5½ per cent. preference will obtain its full rate, though the possibility exists of this being effected. Great Northern Telegraphs are £1 up at 24, and the other issues in the group hold their prices without noticeable changes. Telegraph Constructions, after their rise to 14½, have come back to £13. American Telephone & Telegraph at 175, and International Telephones at 22½, are sharing in the advance of dollar stocks as a whole. International Automatic shares at 30s. are firmer on the week.

Home Electricity Shares

County of London ordinary have moved up to 45s., a rise of 1/16, and Metropolitans at 40s. 9d. show a gain of the pence. These are the only two shares in the London group to exhibit any movement since the General Election. The tendency amongst provincial shares is towards slightly better prices. Small rises have been secured by Clyde Valley, Lancashire Light & Power, Midland Counties, Scottish Power, and Yorkshires. It is in the shares of these provincial companies that greater scope is held to reside for capital appreciation than in those of the London distributors. Once more it is the thought of a possible tariff upon manufactured goods which has had the effect of encouraging buyers of the provincial electricity companies' issues. The impression prevails that home trade will be revivified by the greater business activity of which evidence is already afforded by a modest reduction in unemployment, and by the revival which has set in amongst certain branches of industry in the Midlands and the Northern counties.

Dollar Stocks

The fall in the value of the £ sterling has had the automatic effect of strengthening the prices of dollar stocks. Brazilian Traction shares are an exception, the price at 14½ being a point down. Mississippi River Power 6 per cent. preferred shares, on the other hand, are 25 up at 115. Pennsylvania Water and Power shares at 70 have gained 7½. Montreal Light and Power advanced to 41½. Rio Tramways 5 per cent. first bonds, after being down to 95, rallied to 98½.

Amongst the foreign traction shares, Anglo-Argentine Tramway 5 per cent. debenture is 2 higher at 14½. In the British group, a rise of 50 points has lifted British Electric Traction deferred ordinary to 850, comparing with 600 a fortnight ago. The preferred ordinary stock retains its 7 points rise at 112, and the 6 per cent. preference has advanced to 123.

Manufacturing and Equipment

W. T. Henley's Telegraph Works has declared an interim dividend on the ordinary shares of 1s. 6d., less tax, payable on December 1st, this being the same interim dividend as that paid in each of the five preceding years. Henley's have been accustomed to make this up to 30 per cent. for the year by a final dividend of 12½ per cent., plus a bonus of 10 per cent. The shares at 5¾ show ¼ loss, and the yield on the money at this price, assuming the maintenance of the 30 per cent. dividend, is £5 4s. 4d. per cent. Associated Electrical Industries ordinary have fallen back 1s. 9d. to 23s. 3d., and General Electrics are also lower at 46s. 3d. British Insulated, however, strengthened to 3.1/16. It is stated that the company has secured a contract worth £377,000 for 230 miles of main transmission lines in South Scotland. English Electric ordinary spurted to 11s. 3d., a gain of 2s. 6d., while the preference shares at 8s. 9d. are no more than 1/16 higher. The latter are entitled to a dividend of 6½ per cent., which is not being paid, and which is not yet cumulative. It becomes cumulative, however, in 1933.

Further Advances

A feature amongst manufacturing issues is a rise of 15 in Brush ordinary, the stock jumping to 75. It may be recalled that mention was made here a fortnight ago of the fact that while other stocks and shares in this group were advancing rapidly, the price of Brush ordinary was left out in the cold at 55. Johnson & Phillips rose abruptly to 32s. 6d., showing a gain of 5s. Movements in this market are somewhat mixed, but on the whole they favour the holders of shares. Amongst iron and steel descriptions, the tendency is erratic. Profit-taking reduced the price of Babcock & Wilcox to 51s. 2d., while Vickers kept steady at 10s. 3d. There has been a considerable turn-over of shares every day in this particular section. The rubber share market shows little alteration either in its prices or its comatose condition.

Share List of Electrical Companies

Home Electricity Companies

	Nom.	Approx. Dividend. 1929.	1930.	Price, Nov. 3, 1931.	Rise or Fall.	Yield p.c. £ s. d.
Bournemouth and Poole	£ 1	15	15	58/9	—	5 2 2
Brompton Ordinary	1	8½	8½	27/6	—	5 1 0
Central Electricity 4½% Deb.	Stock	—	4½	88	—	5 2 3
Charing Cross Ordinary	1	8½	8½	29/0	—	4 16 7
Chelsea	1	8⅝	8⅝	26/–	—	5 7 8
City of London	1	10	10	35/–	—	5 14 3
Clyde Valley	1	8	8	32/6	+6d.	4 18 6
County of London	1	11	11	45/–	+⅛	4 17 9
Edmundsons' 7% Pref.	1	7	7	24/6	—	5 14 3
Elec. Supply Corporation	1	11	11	42/6	—	5 3 6
Kensington Ordinary	1	8	8	29/–	—	4 16 7
Lancs. Light and Power	1	7	6½	25/–	—	5 4 0
London & Home Counties 4½% Deb.	Stock	—	—	87½	—	5 2 10
London Electric	1	8½	9	32/6	—	5 10 9
Metropolitan	1	9	10	40/9	+9d.	4 18 2
Midland Counties	1	6½	7	28/9	+6d.	4 17 5
Mid. Elec. Power	1	15	8	28/3	+9d.	5 13 3
Newcastle-on-Tyne Ordinary	1	6	6	25/–	+⅛	4 16 0
Do. 7% Pref.	1	7	7	25/–	—	5 12 9
Notting Hill 6% Pref.	10	6	6	10½	—	5 14 3
North Met. Elec. 6% Pref.	1	6	6	22/6	+6d.	5 6 8
St. James' and Pall Mall	1	8	8	29/–	—	4 16 7
Scottish Power	1	8	8	28/3	+9d.	5 13 3
South London	1	8½	8½	26/6	—	5 5 8
Urban Ordinary	1	7	7	27/-xd	+6d.	5 3 8
Westminster Ordinary	1	8½	8½	28/–	—	5 0 0
Whitehall Elec. Invst. 7½% Pref.	1	7½	7½	22/–	+6d.	6 16 4
Yorkshire Elec.	1	8	8	32/6	+6d.	4 18 6

Home Rails

Central London Ord. Assented	Stock	4	4	70½	—	5 13 6
Metropolitan	"	4	3½	42½	+3	8 4 8
Do. District	"	5	5	61½	+1	8 2 8
Underground Electric	1	8	8	21/–	+2/–	7 12 5

Telegraphs and Telephones

Anglo-Am. Tel. Pref.	Stock	6	6	93½	+½	6 8 4
Do. Def.	"	1½	1½	23	—	6 10 5
Cables & Wireless 5½% Pref.	Stock	5½	5½	64½	+1	—
Do. A 7½% Ord.	"	Nil	—	24½	–½	—
Do. B Ord.	"	Nil	—	15	–⅛	—
Globe Tel. and T. Ord.	10	10	8½	9½	+¼	—
Do. do. Pref.	10	6	6	9	—	6 13 4
Great Northern Tel.	10	20	20	24	+1	8 5 0
Marconi-Marine	1	15	15	36/3	—	8 5 6
Oriental Telephone Ord.	1	12	12	2⅛	—	*5 16 3

Home and Foreign Trams, etc.

Anglo-Arg. Trams First Pref.	5	5½	—	7/6	—	—
Do. do. 2nd Pref.	5	6	—	6/3	—	—
Do. do. 5% Deb.	Stock	5	5	14½	+2	—
British Electric Traction Def. Ord.	"	5	5	850	+50	—
Do. do. Pref. Ord.	"	8	8	112	—	7 2 10
Brazil Traction	100	8	—	14½	–1	—
Brit. Columbia Elec. Rly. Pce.	Stock	5	5	90½	—	5 10 6
London & Sub. Trac. 5% Pref.	1	Nil	Nil	8/3	—	—
London United Tram Deb.	Stock	4	4	57½	—	6 19 2
Mexico Trams, 5% Bonds	—	5	5	25	—	20 0 0
Mexican Light Common	100	Nil	Nil	20	—	—
Do. 7% Pref.	100	7	7	35	—	20 0 0
Do. 1st Bonds	—	5	5	45	—	11 2 2
Victoria Falls Ord.	1	15	15	58/9	—	5 2 2
Yorkshire (West Riding)	1	Nil	Nil	6/3	—	—

Manufacturing Companies

Assoc. Elec. Ord.	1	6	6	23/3	–1/9	5 3 3
Do. Pref.	1	8	8	27/6	—	5 16 5
Babcock & Wilcox	1	15	14	51/3	–3/3	*5 9 3
British Aluminium Ord.	1	10	10	31/3	—	6 8 0
British Insulated Ord.	1	15	15	3⅛	+⅛	4 18 0
Brush Ord.	Stock	10	5	75	+15	6 13 4
Callender's	1	15	15	2⅞	–¼	5 4 4
Do. 6½% Pref.	1	6½	6½	22/6	—	5 15 7
Crompton Parkinson Ord.	5/–	30	30	22/6	—	6 13 4
Do. 8% Pref.	1	8	8	28/3	—	5 13 3
Edison-Swan 1st Pref.	1	7½	7½	23/3	—	6 9 0
Do. 5% Deb.	Stock	5	5	91½	–1	5 9 3
Electric Construction	1	5	Nil	12/6	—	—
Enfield Cable Ord.	1	25	25	4½	—	5 17 8
English Electric	1	Nil	Nil	11/3	+½	—
Do. do. Pref.	1	Nil	Nil	8/9	+⅛	—
Ferranti Pref.	1	7	7	21/3	+1/–	6 11 9
G.E.C. Pref.	1	6½	6½	23/–	—	5 13 1
Do. Ord.	1	14	10	46/3	–⅛	4 6 6
Henley's	1	30	30	5½	–⅛	5 4 4
Do. 4½% Pref.	5	4½	4½	4½	—	5 6 0
India-Rubber	1	Nil	Nil	6/3	—	—
Johnson & Phillips	1	10	10	32/6	+1½	6 3 1
Siemens Ord.	1	7½	7½	24/6	—	6 2 5
Telegraph Construction	12	10	7½	13	–1½	6 18 6

* Dividends paid free of Income Tax.

Published Specifications

Compiled expessly for this journal by a firm of chartered patent agents. The numbers in parentheses are those under which the specifications will be printed and abridged, and all subsequent proceedings will be taken.

1930.

10,552. "Electric batteries." M. Wilderman and P. Wilderman. April 3rd, 1930. (358,466.)

17,545. "Photo-electric cells and arrangements for use therewith." Telefunken Ges. für Drahtlose Telegraphie. June 6th, 1929. (358,539.)

17,597. "Selective protection of electric distributing networks having an insulated neutral point." A. Jonnart. June 14th, 1929. (358,541.)

17,639. "Electric arc lamps." A. E. White (Sperry Gyroscope Co., Inc.). June 6th, 1930. (358,542.)

17,790. "Mercury-vapour rectifiers." Akt.-Ges. Brown, Boveri, et Cie. Aug. 28th, 1929. (358,543.)

19,850. "Apparatus for the examination of pearls with the aid of X-rays." Naamlooze Vennootschap Philips' Gloeilampenfabrieken. July 15th, 1929. (358,430.)

19,956. "Remote-control apparatus." Westinghouse Brake and Saxby Signal Co., Ltd. July 17th, 1929. (358,479.)

20,050. "Television systems." P. E. Maloney. July 2nd, 1930. (358,433.)

20,292. "Telephone systems." Burovox, Ltd., and S. Cauthery. July 4th, 1930. (358,548.)

20,314. "Electron tubes." Igranic Electric Co., Ltd. (Cutler-Hammer Manufacturing Co.). July 4th, 1930. (358,550.)

20,346. "Electric regulating-devices." Aktiebolaget Birka Regulator. July 6th, 1929. (358,551.)

20,518. "Mounting arrangements for electric relays." Elliott Bros. (London), Ltd., and F. N. Kirby. July 7th, 1930. (358,486.)

20,530. "Electric switches or circuit breakers with arc-quenching means." S. Ruppel. July 6th, 1929. (358,554.)

20,552. "Circuit for the supervision of Ljungstrom generators." Siemens-Schuckertwerke Akt.-Ges. July 18th, 1929. (358,504.)

20,580. "Electric control systems." R. J. Stevens. July 7th, 1930. (Cognate application 29,298/30.) (358,516.)

20,658. "Vacuum electron-discharge tubes." Arcturus Radio Tube Co. July 13th, 1929. (358,557.)

20,723. "Alternating current arc-welding apparatus." J. B. Hansell and Associated Electrical Industries, Ltd. July 8th, 1930. (358,506.)

20,885. "Transmission systems for telephony or the like." Standard Telephones & Cables, Ltd., K. G. Hodgson and S. H. Grove. July 10th, 1930. (358,564.)

20,887. "Method of and system for composite cable operation." A. A. Clokey and International Communications Laboratories, Inc. July 10th, 1930. (358,565.)

20,914. "Alternating current rectifying systems." British Thomson-Houston Co., Ltd. Aug. 21st, 1929. (358,569.)

20,949. "Electric discharge devices." British Talking Pictures, Ltd. July 13th, 1929. (358,571.)

21,548. "Electric arc-welding apparatus." Dorman Long & Co., Ltd., and F. R. Freeman. July 16th, 1930. (358,608.)

21,956. "Gaseous electric discharge devices." British Thomson-Houston Co., Ltd. July 27th, 1929. (358,614.)

22,291. "Signalling and control apparatus for road traffic." W. Murray. July 24th, 1930. (358,620.)

22,405. "Connectors for flexible electric conduits." J. B. Dumbell, P. B. Dumbell, and T. Starkey. July 25th, 1930. (358,623.)

22,614. "Multiple conductor electric cable joints." W. W. Triggs (Ohio Brass Co.). July 26th, 1930. (358,625.)

22,751. "Flexible electric insulating clip." J. B. Tannahill. July 29th, 1930. (358,627.)

23,068. "Manufacture or production of junction boxes for use in connection with electric wiring conduits." W. J. Garratt, H. Garratt, and H. Wootton. July 31st, 1930. (358,632.)

23,107. "Switch for audio- or radio-frequency electric circuits." Standard Telephones & Cables, Ltd., C. R. Dunham, and D. A. Craddock. July 31st, 1930. (358,634.)

24,255. "Electron discharge tubes or thermionic valves." Naamlooze Vennootschap Philips' Gloeilampenfabrieken. Sept. 19th, 1929. (358,649.)

24,830. "Electric furnaces." British Hartford-Fairmont Syndicate, Ltd. July 3rd, 1930. (358,656.)

26,457. "Electromagnetic escapements for clock mechanisms." R. Michi. Sept. 4th, 1929. (358,673.)

26,837. "Devices for detecting insulation faults in electric cables." A. H. Finch and Imeson & Finch, Ltd. Sept. 8th, 1930. (358,677.)

27,189. "Electric automatic train-control apparatus." C. Lorenz Akt.-Ges. Sept. 11th, 1929. (358,680.)

27,408. "Safety device for electric heaters." S. B. Nicholson. Sept. 13th, 1930. (358,681.)

27,638. "Cooling of electric glass container rectifiers." Elin Akt.-Ges. für Elektrische Industrie. Jan. 30th, 1930. (Addition to 25,444/30.) (358,687.)

28,434. "Control devices for radio-tuning elements." Sparks-Withington Co. Oct. 11th, 1929. (358,700.)

28,435. "Variable electric condensers." Sparks-Withington Co. Nov. 9th, 1929. (358,701.)

28,837. "Synchronous motors of the type comprising an unwound iron rotor." O. Janzen. Jan. 17th, 1930. (358,709.)

31,318. "Keyboard mechanisms for printing telegraph apparatus." W. W. Triggs (Teletype Corpn.). Oct. 18th, 1930. (358,737.)

31,480. "Electrical tumbler switches." J. A. Crabtree. Oct. 21st, 1930. (358,738.)

32,025. "Lighting apparatus." Anciens Etablissements Barbier, Benard & Turenne Soc. Anon. March 21st, 1930. (358,744.)

36,642. "Thermionic frequency multipliers." Telefunken Ges. für Drahtlose Telegraphie. Dec. 2nd, 1929. (358,754.)

32,674. "Electric motors." Forges & Ateliers de Constructions Electriques de Jeumont. Nov. 15th, 1929. (358,755.)

32,891. "Constant-current transformers." Westinghouse Electric & Manufacturing Co. Nov. 1st, 1929. (358,757.)

32,922. "Direction finders incorporating electron-discharge devices." Perryman Electric Co., Inc. Nov. 2nd, 1929. (358,758.)

33,939. "Eddy-current track brakes." Ges. für Oberbauforschung und Rangiertechnik. Nov. 26th, 1929. (358,767.)

35,216. "Arrangement of pin contacts for large currents." Voigt & Haeffner Akt.-Ges. Jan. 21st, 1930. (358,788.)

36,709. "Electrolytic manufacture of magnesium." A. C. Jessup. Dec. 5th, 1930. (358,794.)

36,736. "Fusible electric cut-outs." Callender's Cable & Construction Co., Ltd., and A. E. Wilson. Dec. 5th, 1930. (358,795.)

36,843. "Joints for electric cables." W. T. Henley's Telegraph Works Co., Ltd., E. Moor, and W. C. Barry. Dec. 6th, 1930. (Addition to 340,426.) (358,796.)

37,117. "Anti-vibration devices for overhead electric transmission lines or other overhead cables." Electrical Improvements, Ltd., and P. J. Ryle. Dec. 19th, 1930. (358,800.)

38,089. "Sparking plugs." Fabrica Italiana Magneti Marelli. Sept. 15th, 1930. (Addition to 22,266/30.) (358,809.)

38,097. "Apparatus for winding electrical coils." British Thomson-Houston Co., Ltd. Dec. 17th, 1929. (358,810.)

1931.

5,288. "Electric transformers." General Electric Co., Ltd. April 16th, 1930. (358,846.)

7,817. "High-frequency signalling systems." British Thomson-Houston Co., Ltd. March 20th, 1930. (358,855.)

9,436. "Directional radio-transmitting systems." Telefunken Ges. für Drahtlose Telegraphie and W. Sudenia. March 29th, 1930. (358,859.)

9,796. "Wireless receiving circuit with automatic volume control." Naamlooze Vennootschap Philips' Gloeilampenfabrieken. April 15th, 1930. (358,861.)

11,062. "Intermediate frequency transformers for wireless reception." London Electric Wire Co. & Smiths, Ltd., and W. F. Boyd. April 14th, 1931. (358,862.)

13,383. "Electric control systems." R. J. Stevens. July 7th, 1930. (Cognate applications 13,384/31 and 35,907/30.) (358,587.)

21,182. "Light-controlling apparatus." British Thomson-Houston Co., Ltd. July 29th, 1930. (358,871.)

Trade Mark Applications

THE following are among the recent applications for British trade marks. Objections against any of the proposed marks may be entered within one month from October 23rd:—

Thyrite. No. 516,437. Class 8. Lightning arresters.—British Thomson-Houston Co., Ltd., Crown House, Aldwych, W.C.2.

Horse design only. No. 523,667. Class 8. Dry batteries for use in radio-telephony and telegraphy.—Pala a Spol Akciova Tovarna Elektrickych Clanku a Baterii Veslanem, Slany, Czechoslovakia. (British representatives: Pala Battery Co. (London), Ltd., 6-7, New Wharf Road, King's Cross, N.1.).

Silochrome. No. 524,813. Class 8. Electro-plating apparatus.—Turnbridge Manufacturing & Supply Co., Ltd., 52a-62a, Longley Road, Tooting, S.W.17.

Atlastone. No. 525,523. Atlastat. No. 525,524. Class 8. Coils, variometers, variable and fixed condensers, rheostats and resistances, etc., all being component parts of radio apparatus.—H. Clarke & Co. (Manchester), Ltd., Eastnor Street, Old Trafford, Manchester.

Unicray. No. 524,538. Class 13. Electric lamps (ordinary), and Superlux. No. 528,312. Class 50. Electric lamp shades.—J. Weinbaum, trading as the Stormlight Incandescent & Electrical Co., 160,164, Mile End Road, E.1.

Wrendal. No. 525,613. Class 13. Electric lamps (ordinary).—W. D. Snape, trading as L. Andrew & Co., 2, Whitworth Street West, Deansgate, Manchester.

Leanda. No. 525,879. Class 13. Electric lamps (ordinary).—Electrical Equipment & Carbon Co., Ltd., 107-111, New Oxford Street, W.C.1.

Isoelectric. No. 523,886. Class 15. Heating, evaporating, distilling and impregnating plant.—Kestner Evaporator & Engineering Co., Ltd., 5, Grosvenor Gardens, S.W.1.

Rubex. No. 523,671. Class 40. Separators made of india-rubber or gutta-percha for electric accumulators.—Chloride Electrical Storage Co., Ltd., Clifton Junction, Manchester.

Mastolite. No. 517,643. Class 50. Panels for high-pressure switchgear, being goods made of a condensation product of phenol and formaldehyde.—Symentis Products, Ltd., Silk Street, Eccles, Manchester.

Electric Cooking in Germany

Dipl. Ing. Fr. Mortsch, in a recent article in the *E.T.Z.*, states that the adoption of electric cooking appliances has made rapid progress in Germany in recent years, but that hitherto there have been no statistics available relating to this. With the object of gleaning some idea of the extent to which such appliances are now used, the Union of German Electric Power Stations lately sent out a questionnaire to its members, and a summary of the replies shows that the number of electric cookers of all kinds in use throughout Germany at the end of 1930 totalled 45,153. Although, having regard to the population of the country, that number is relatively small, it is evident from the increase of 27,471, or about 65 per cent., over 1929 that more rapid progress may be expected in the near future, especially as in many of the large towns, notably Dresden, Hamburg, and Munich, special tariffs for cooking appliances have been introduced. Not only is it in private residences that cooking by electricity is progressing; it is also rapidly being adopted in the kitchens of hotels, hospitals, and other public institutions.

New Work for Contractors

Particulars of new works and building schemes for the use of electrical installation contractors and traders

Publication in this list is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors.

Alton (HANTS).—Houses (52) for the U.D.C.; surveyor.

Amersham (BUCKS).—Houses (22), Amersham Common, for the R.D.C.; Kemp & How, architects, 4, Bloomsbury Square, London, W.C.

Annfield Plain (Co. DURHAM).—Dairy (£23,000) for the Co-operative Wholesale Society; C.W.S. building department, Newcastle-on-Tyne.

Ashford (KENT).—Rebuilding business premises for W. H. Gibbs, 97, High Street.

Ashton-under-Lyne.—Post office extensions for H.M. Office of Works, King Charles Street, London, S.W.

Ayr.—Cinema (£12,000); John MacAllister, Bath Street, Glasgow.

Barking.—Two schools, Becontree estate, for the E.C.

Basford (NOTTS).—Houses (20), Selston, for the R.D.C.; Stephen Maylan, engineer and surveyor, Public Offices, Rock House.

Bentley-with-Arksey.—Office, garage and stores, Watch Lane; West Riding surveyor, County Hall, Wakefield.

Birmingham.—Office premises, Newhall Street; H. O. Ellis and Clarke, architects, 3, Newhall Street. Telephone exchange, Highbury; Contracts Branch, H.M. Office of Works, King Charles Street, S.W.1.

Bishop's Stortford.—Hospital extensions (£20,000), with electric lift; G. L. Thurgood & Son, builders, Much Hadham.

Bolton.—Rebuilding premises, Newport Street and Great Moor Street, for T. J. Shannon; William Townson & Sons, Ltd., builders, Park Hill Street.

Brechin.—Casual ward for the Public Assistance Committee (£2,200); burgh surveyor.

Brentford.—Workshops, sewage works (£4,000); U.D.C. surveyor.

Bristol.—Houses (238), Southmead housing site, for the C.C.; city engineer, 51, Prince Street.

Bronglaise.—Maternity home (£2,195), for the Cardiganshire C.C.

Burntisland.—Electric cranes at the East Dock for the L.N.E.R.

Cannock (STAFFS).—Cookery centre, Hightown (£2,000), for the E.C.; director of education.

Carlisle.—Installation of electric lighting at the Gilsland Convalescent Home for the T.C.; Mr. Salt, electrical engineer, Town Hall.

Catterick (YORKS).—Additions to the C. of E. schools; Herbert D. Pritchett, architect, 12, High Row, Darlington.

Chelmsford.—Housing scheme (14 acres), Waterhouse Lane; borough engineer. Development, Kingston estate; J. Gowers.

Cheltenham.—Houses (58) for the T.C.; borough surveyor. Houses, off Naunton Lane; Naunton Estates, Ltd.

Church Minshull (CHESHIRE).—Re-erection of factory (electrically equipped) for the Shaka Salt Co.; Mr. Burrows.

Cockermouth (LANCS).—Police station; county architect.

Cumberland.—Admission block at the Garlands Mental Hospital for the C.C.; county surveyor, Carlisle. School, Wigton, for the C.C.; county architect, Carlisle.

Droitwich.—Extension of baths and business block; secretary, Town Improvement Association.

Dudley.—Shops, Birmingham Road; S. C. Lloyd, Ltd.

Durham.—Secondary school, Stockton-on-Tees, for the county E.C.; F. Willey, architect, 34, Old Elvet.

Edinburgh.—Houses for the trustees of the Douglas Haig Memorial Homes; Lorimer & Matthew, architects.

Elgin.—Housing scheme for the T.C. (£13,000); burgh surveyor.

Enfield.—Factory, Great Cambridge Road; J. Neilson, London Road.

Essex.—Extensions, Sutton Institution, Hornchurch (£100,000), for the Public Assistance Committee; clerk, Chelmsford. Extensions, Pitsea school (£13,965), for the County E.C.; J. Stuart, county architect, Chelmsford. Two schools, Rylands estate, Dagenham; director of education, Chelmsford.

Glasgow.—Housing scheme, Blackhill golf course; housing director. Alterations and additions to the head offices of the British Linen Co.; Daniel McCallum, builders, 38a, Pitt Street. R.C. school at Tollcross; city architect.

Hatfield (HERTS).—Extension of Congregational church; trustees.

Herne Bay.—Houses (31), Claremont Street site, for the U.D.C.; surveyor.

Hertfordshire.—Schools, Barnet Vale, Buntingford, Cheshunt, and Watford, for the county E.C.

Heston and Isleworth.—Flats, houses, and shops, Park Avenue, Argyle and Grove Park Roads; P. Chase, Gardener & Co. Houses (150), Barrack Field estate; F. Warren. Flats (40) and houses at Erncroft Farm estate, for Middlesex C.C.; G. R. King. Showroom at Heston Air Port, Cranford Lane; A. Pascall & Sons, Ltd.

High Wycombe (BUCKS).—Factory, Sands, for A. Abbott.

Holyhead.—Houses (27) for the U.D.C.; T. E. Thomas, architect, Porthyfelin Road.

Houghton-le-Spring.—Houses (76) for the U.D.C.; J. Hunter, architect, Council Offices.

Hucknall (NOTTINGHAM).—Houses (48), Brookside estate, for the U.D.C.; H. M. Aitchison, architect and surveyor, Council Offices.

Ilminster (SOMERSET).—Rebuilding premises, East Street, for Mitchell, Toms & Co., Ltd.

Ince (LANCS).—Houses (164), Westwood, for the U.D.C.; P. Fairclough, surveyor.

Irish Free State (DUBLIN).—Libraries (£20,000); city architect. (LOUTH.)—Houses (12), Ardee (£4,112); James Rooney, Balbriggan, Co. Dublin. (WICKLOW.)—Housing scheme, Dunbur Road; H. J. MacPhail, town clerk, Town Hall.

Kempston (BEDFORD).—Houses (26), Bellevue estate, for the U.D.C.; P. W. Cooper, surveyor.

Littlehampton (SUSSEX).—Houses (40), Thorncroft site, for the U.D.C.; surveyor.

Liverpool.—Extensions and alterations to the churches at Green Lane and Walney Island, Barrow; Dobie & Morter, architects, Dale Street.

London (BERMONDSEY).—Alterations to R.C. church, Dockhead; rector. (BOW.)—Offices, Bow Road (£4,000); L.C.C. architect. (CHISWICK.)—Alterations and additions, 282, High Road; Boots, Ltd. (DEPTFORD.)—Premises, corner of Creek Road and Lammerton Street; Greenline Garages, Ltd. (FINCHLEY.)—Houses (87) and flats (42), various sites; U.D.C. surveyor. Elementary school, Summers Lane, for the E.C. (HAMMERSMITH.)—Four blocks of flats, Cathnor Road; F. Witt. Three shops, Goldhawk Road; D. Lewis. Additions, 1, St. Peter's Square; Curtis Green & Partners. (HORNSEY.)—Alterations and additions, 106-8, High Street; M. K. Matthews. Additions for Smithfield Refrigerator Co., Ltd., Cross Lane; W. H. Partridge. (ILFORD.)—Houses (26), Brockham Drive, and 76, Ramsgill Drive; J. Aldridge. Houses (20), Gordon Road; E. Linnsen. Houses (23), Looe Gardens; G. F. Seigerts. Extension of Congregational church; trustees. Extensions, Gearies schools, for the borough E.C.; L. E. J. Reynolds, architect, Town Hall. (KILBURN.)—Shops at railway station; L.M.S. Railway. (LEWISHAM.)—Premises, corner of High Street and Myron Place; Edmond Coignet, Ltd. (LEYTON.)—Flats (12) equipped for electric heating, cooking, &c., at Jesse Road, for the T.C. (£8,700); borough surveyor. (STREATHAM.)—Elementary school, Leigham Court Road (400 places); L.C.C. architect. (WHITECHAPEL.)—Extension, Johnson Street school (280 places); Catholic trustees. (WIMBLEDON.)—Premises, Victoria Crescent; Kennards (Wimbledon), Ltd. (WOOD GREEN.)—Alterations, 59, High Road; Hamblin Fox & Bailey. (WOOLWICH.)—Elementary school, Middle Park estate; L.C.C. architect.

Looe (CORNWALL).—Houses (20) for the U.D.C. H. R. Venning, architect, Midland Bank Chambers, Liskeard.

Maidstone.—Houses (80), Western Road, for the T.C.; T. F. Bunting, borough surveyor.

Manchester.—Alterations and additions, Opera House, Quay Street; licensee. New wing St. Bede's College, Alexandra Road South, Alexandra Park, for the Board of Governors; Moston Brick & Building Co., Ltd., builders, Kenyon Lane, Moston.

Margate.—Conversion of premises into public library, for the T.C.; borough engineer.

Middlesex.—Schools, Enfield, Hatch End, Hayes, Ickenham, and Kingsbury, for the county E.C.

Newcastle-on-Tyne.—Reconstruction of babies' hospital premises in Westmorland Road; Hill & Honeyman, architects, 6, Eldon Square.

Norfolk.—Extensions, St. James's House, King's Lynn, for the C.C.; C. J. Norton, architect, Stracey Road, Norwich.

Northern Ireland (BELFAST).—Alterations to Raleigh House, Queen Street, for the B.C.; W. H. Stephens & Sons, surveyors, 13, Donegall Square, North Belfast.

North Kesteven.—Waterworks (£50,000); surveyor to the R.D.C.

Northumberland.—Schools at Forest Hall, Choppington, and Murton, for the C.C.; W. W. Tasker, architect, 17, Claremount Place, Newcastle-on-Tyne.

Oswestry.—National schools; vicar of Oswestry.

Peebles.—Reconstruction of premises, Bridegate, as casual house; clerk to the County Public Assistance Committee.

Preston.—Extension of St. Joseph's R.C. Hospital, Mount Street; governors.

Reading.—Reconstruction of St. Laurence Hall; Roland W. Howell, architect, 17, Blagrave Street.

Reigate.—Housing scheme, South Park, for the T.C.; borough surveyor.

Ripon.—Extensions to Omnibus depôt, Park Street; United Automobile Services, Ltd.

Romiley.—Catholic church for the Rev. Father O. R. Calderbank; Edmund Kirby & Sons, architects, 5, Cook Street, Liverpool.

Sandy (BEDS).—Houses (20), West Road building site, for the U.D.C.; F. C. Levitt.

Stockton-on-Tees.—Elementary school for the T.C.; J. P. Wakeford, borough engineer, Town Hall.

Sunbury.—Sewage works (£161,000); U.D.C. surveyor.

Thorne (YORKS).—Houses (100), Moorends, for the R.D.C.; H. Plews, surveyor.

Torquay.—Development, Upton Leigh estate; E. Green.

Usworth (DURHAM).—Aerodrome for the Air Ministry.

Warrington.—Houses (26), various parishes; R.D.C. surveyor. Alterations, Factory Lane; J. Crossfield & Sons, Ltd.

Welwyn (HERTS).—Houses (54) for the R.D.C.; Bennett Bros., builders.

Weston-super-Mare.—Houses (32), Worle, Brent Knoll, and Puxton; Ball & Pope, architects, 30, West Street.

Weymouth.—Houses (62) for the T.C.; borough surveyor.

Withington.—Church, Minehead Avenue; Bernard A. Miller, architect, 3, Abercromby Square, Liverpool.

Overhead-line Wayleaves

It is announced by the National Farmers' Union that the Central Electricity Board has, as a result of the Union's representations, agreed to pay double compensation per tower erected on arable land, which is worked at least twice in any one year, and on which more than one crop is raised in any such year. The Board will also pay double compensation in respect of towers on arable land which is steam cultivated, and negotiations are proceeding between the Board and the Union in respect of extra compensation for towers erected on arable land which is cultivated by tractor.